autogluon_each_location

October 10, 2023

[1]:
```
# config

label = 'y'
metric = 'mean_absolute_error'
time_limit = 60*60*4
presets = 'best_quality'

do_drop_ds = True
# hour, dayofweek, dayofmonth, month, year
use_dt_attrs = []#"hour", "dayofweek", "day", "month", "year"]
use_estimated_diff_attr = False
use_is_estimated_attr = True

use_groups = False
n_groups = 8

auto_stack = False
num_stack_levels = 3
num_bag_folds = 8
if auto_stack:
    num_stack_levels = None
    num_bag_folds = None

use_tune_data = False
use_test_data = False
tune_and_test_length = 24*30*3 # 3 months from end, this changes the␣
 ↪evaluations for only test
holdout_frac = None
use_bag_holdout = False # Enable this if there is a large gap between score_val␣
 ↪and score_test in stack models.

sample_weight = None#'sample_weight' #None
weight_evaluation = False#True #False
sample_weight_estimated = 1 # this changes evaluations for test and tune WTF,␣
 ↪cant find a fix

run_analysis = False
```

[2]:
```
import pandas as pd
import numpy as np



import warnings
warnings.filterwarnings("ignore")

def fix_datetime(X, name):
    # Convert 'date_forecast' to datetime format and replace original column␣
 ↪with 'ds'
    X['ds'] = pd.to_datetime(X['date_forecast'])
    X.drop(columns=['date_forecast'], inplace=True, errors='ignore')
    X.sort_values(by='ds', inplace=True)
    X.set_index('ds', inplace=True)

    # Drop rows where the minute part of the time is not 0
    X = X[X.index.minute == 0].copy()
    return X



def convert_to_datetime(X_train_observed, X_train_estimated, X_test, y_train):
    X_train_observed = fix_datetime(X_train_observed, "X_train_observed")
    X_train_estimated = fix_datetime(X_train_estimated, "X_train_estimated")
    X_test = fix_datetime(X_test, "X_test")

    # add sample weights, which are 1 for observed and 3 for estimated
    X_train_observed["sample_weight"] = 1
    X_train_estimated["sample_weight"] = sample_weight_estimated
    X_test["sample_weight"] = sample_weight_estimated

    if use_estimated_diff_attr:
        X_train_observed["estimated_diff_hours"] = 0
        X_train_estimated["estimated_diff_hours"] = (X_train_estimated.index -␣
 ↪pd.to_datetime(X_train_estimated["date_calc"])).dt.total_seconds() / 3600
        X_test["estimated_diff_hours"] = (X_test.index - pd.
 ↪to_datetime(X_test["date_calc"])).dt.total_seconds() / 3600

        X_train_estimated["estimated_diff_hours"] =␣
 ↪X_train_estimated["estimated_diff_hours"].astype('int64')
        # the filled once will get dropped later anyways, when we drop y nans
        X_test["estimated_diff_hours"] = X_test["estimated_diff_hours"].
 ↪fillna(-50).astype('int64')

    if use_is_estimated_attr:
        X_train_observed["is_estimated"] = 0
```

```
        X_train_estimated["is_estimated"] = 1
        X_test["is_estimated"] = 1


    X_train_estimated.drop(columns=['date_calc'], inplace=True)
    X_test.drop(columns=['date_calc'], inplace=True)

    y_train['ds'] = pd.to_datetime(y_train['time'])
    y_train.drop(columns=['time'], inplace=True)
    y_train.sort_values(by='ds', inplace=True)
    y_train.set_index('ds', inplace=True)

    return X_train_observed, X_train_estimated, X_test, y_train




def preprocess_data(X_train_observed, X_train_estimated, X_test, y_train,␣
 ↪location):
    # convert to datetime
    X_train_observed, X_train_estimated, X_test, y_train =␣
 ↪convert_to_datetime(X_train_observed, X_train_estimated, X_test, y_train)

    y_train["y"] = y_train["pv_measurement"].astype('float64')
    y_train.drop(columns=['pv_measurement'], inplace=True)
    X_train = pd.concat([X_train_observed, X_train_estimated])

    # fill missng sample_weight with 3
    #X_train["sample_weight"] = X_train["sample_weight"].fillna(0)


    # clip all y values to 0 if negative
    y_train["y"] = y_train["y"].clip(lower=0)

    X_train = pd.merge(X_train, y_train, how="inner", left_index=True,␣
 ↪right_index=True)

    # print number of nans in sample_weight
    print(f"Number of nans in sample_weight: {X_train['sample_weight'].isna().
 ↪sum()}")
    # print number of nans in y
    print(f"Number of nans in y: {X_train['y'].isna().sum()}")


    X_train["location"] = location
    X_test["location"] = location
```

```
    return X_train, X_test
# Define locations
locations = ['A', 'B', 'C']

X_trains = []
X_tests = []
# Loop through locations
for loc in locations:
    print(f"Processing location {loc}...")
    # Read target training data
    y_train = pd.read_parquet(f'{loc}/train_targets.parquet')

    # Read estimated training data and add location feature
    X_train_estimated = pd.read_parquet(f'{loc}/X_train_estimated.parquet')

    # Read observed training data and add location feature
    X_train_observed= pd.read_parquet(f'{loc}/X_train_observed.parquet')

    # Read estimated test data and add location feature
    X_test_estimated = pd.read_parquet(f'{loc}/X_test_estimated.parquet')

    # Preprocess data
    X_train, X_test = preprocess_data(X_train_observed, X_train_estimated,␣
 ↪X_test_estimated, y_train, loc)

    X_trains.append(X_train)
    X_tests.append(X_test)

# Concatenate all data and save to csv
X_train = pd.concat(X_trains)
X_test = pd.concat(X_tests)
```

```
Processing location A…
Number of nans in sample_weight: 0
Number of nans in y: 0
Processing location B…
Number of nans in sample_weight: 0
Number of nans in y: 4
Processing location C…
Number of nans in sample_weight: 0
Number of nans in y: 6059
```

1 Feature enginering

[3]:
```
import numpy as np
import pandas as pd

X_train.dropna(subset=['y'], inplace=True)


for attr in use_dt_attrs:
    X_train[attr] = getattr(X_train.index, attr)
    X_test[attr] = getattr(X_test.index, attr)

print(X_train.head())




if use_groups:
    # fix groups for cross validation
    locations = X_train['location'].unique()  # Assuming 'location' is the name␣
 ↪of the column representing locations

    grouped_dfs = []  # To store data frames split by location

    # Loop through each unique location
    for loc in locations:
        loc_df = X_train[X_train['location'] == loc]

        # Sort the DataFrame for this location by the time column
        loc_df = loc_df.sort_index()

        # Calculate the size of each group for this location
        group_size = len(loc_df) // n_groups

        # Create a new 'group' column for this location
        loc_df['group'] = np.repeat(range(n_groups),␣
 ↪repeats=[group_size]*(n_groups-1) + [len(loc_df) - group_size*(n_groups-1)])

        # Append to list of grouped DataFrames
        grouped_dfs.append(loc_df)

    # Concatenate all the grouped DataFrames back together
    X_train = pd.concat(grouped_dfs)
    X_train.sort_index(inplace=True)
    print(X_train["group"].head())
```

```
to_drop = ["snow_drift:idx", "snow_density:kgm3"]

X_train.drop(columns=to_drop, inplace=True)
X_test.drop(columns=to_drop, inplace=True)

X_train.to_csv('X_train_raw.csv', index=True)
X_test.to_csv('X_test_raw.csv', index=True)
```

```
                    absolute_humidity_2m:gm3  air_density_2m:kgm3  \
ds
2019-06-02 22:00:00                       7.7                1.230
2019-06-02 23:00:00                       7.7                1.225
2019-06-03 00:00:00                       7.7                1.221
2019-06-03 01:00:00                       8.2                1.218
2019-06-03 02:00:00                       8.8                1.219

                    ceiling_height_agl:m  clear_sky_energy_1h:J  \
ds
2019-06-02 22:00:00           1744.900024               0.000000
2019-06-02 23:00:00           1703.599976               0.000000
2019-06-03 00:00:00           1668.099976               0.000000
2019-06-03 01:00:00           1388.400024               0.000000
2019-06-03 02:00:00           1108.500000            6546.899902

                    clear_sky_rad:W  cloud_base_agl:m  dew_or_rime:idx  \
ds
2019-06-02 22:00:00             0.0       1744.900024              0.0
2019-06-02 23:00:00             0.0       1703.599976              0.0
2019-06-03 00:00:00             0.0       1668.099976              0.0
2019-06-03 01:00:00             0.0       1388.400024              0.0
2019-06-03 02:00:00             9.8       1108.500000              0.0

                    dew_point_2m:K  diffuse_rad:W  diffuse_rad_1h:J  …  \
ds                                                                    …
2019-06-02 22:00:00      280.299988            0.0          0.000000  …
2019-06-02 23:00:00      280.299988            0.0          0.000000  …
2019-06-03 00:00:00      280.200012            0.0          0.000000  …
2019-06-03 01:00:00      281.299988            0.0          0.000000  …
2019-06-03 02:00:00      282.299988            4.3       7743.299805  …

                    total_cloud_cover:p  visibility:m  wind_speed_10m:ms  \
ds
2019-06-02 22:00:00                100.0  39640.101562                3.7
2019-06-02 23:00:00                100.0  41699.898438                3.5
2019-06-03 00:00:00                100.0  20473.000000                3.2
```

```
2019-06-03 01:00:00                100.0   2104.600098                2.8
2019-06-03 02:00:00                100.0   2681.600098                2.7

                     wind_speed_u_10m:ms  wind_speed_v_10m:ms  \
ds
2019-06-02 22:00:00                 -3.6                 -0.8
2019-06-02 23:00:00                 -3.5                  0.0
2019-06-03 00:00:00                 -3.1                  0.7
2019-06-03 01:00:00                 -2.7                  0.8
2019-06-03 02:00:00                 -2.5                  1.0

                     wind_speed_w_1000hPa:ms  sample_weight  is_estimated  \
ds
2019-06-02 22:00:00                     -0.0              1             0
2019-06-02 23:00:00                     -0.0              1             0
2019-06-03 00:00:00                     -0.0              1             0
2019-06-03 01:00:00                     -0.0              1             0
2019-06-03 02:00:00                     -0.0              1             0

                        y  location
ds
2019-06-02 22:00:00   0.00         A
2019-06-02 23:00:00   0.00         A
2019-06-03 00:00:00   0.00         A
2019-06-03 01:00:00   0.00         A
2019-06-03 02:00:00  19.36         A

[5 rows x 49 columns]
```

[4]:
```python
from autogluon.tabular import TabularDataset, TabularPredictor
from autogluon.timeseries import TimeSeriesDataFrame
import numpy as np
train_data = TabularDataset('X_train_raw.csv')
# set group column of train_data be increasing from 0 to 7 based on time, the␣
 ↪first 1/8 of the data is group 0, the second 1/8 of the data is group 1, etc.
train_data['ds'] = pd.to_datetime(train_data['ds'])
train_data = train_data.sort_values(by='ds')

# # print size of the group for each location
# for loc in locations:
#     print(f"Location {loc}:")
#     print(train_data[train_data["location"] == loc].groupby('group').size())


# get end date of train data and subtract 3 months
split_time = pd.to_datetime(train_data["ds"]).max() - pd.
 ↪Timedelta(hours=tune_and_test_length)
```

```
train_set = TabularDataset(train_data[train_data["ds"] < split_time])
test_set = TabularDataset(train_data[train_data["ds"] >= split_time])
if use_groups:
    test_set = test_set.drop(columns=['group'])

if do_drop_ds:
    train_set = train_set.drop(columns=['ds'])
    test_set = test_set.drop(columns=['ds'])
    train_data = train_data.drop(columns=['ds'])


def normalize_sample_weights_per_location(df):
    for loc in locations:
        loc_df = df[df["location"] == loc]
        loc_df["sample_weight"] = loc_df["sample_weight"] /␣
 ↪loc_df["sample_weight"].sum() * loc_df.shape[0]
        df[df["location"] == loc] = loc_df
    return df

tuning_data = None
if use_tune_data:
    train_data = train_set
    if use_test_data:
        # split test_set in half, use first half for tuning
        tuning_data, test_data = [], []
        for loc in locations:
            loc_test_set = test_set[test_set["location"] == loc]
            loc_tuning_data = loc_test_set.iloc[:len(loc_test_set)//2]
            loc_test_data = loc_test_set.iloc[len(loc_test_set)//2:]
            tuning_data.append(loc_tuning_data)
            test_data.append(loc_test_data)
        tuning_data = pd.concat(tuning_data)
        test_data = pd.concat(test_data)
        print("Shapes of tuning and test", tuning_data.shape[0], test_data.
 ↪shape[0], tuning_data.shape[0] + test_data.shape[0])

    else:
        tuning_data = test_set
        print("Shape of tuning", tuning_data.shape[0])

    # ensure sample weights for your tuning data sum to the number of rows in␣
 ↪the tuning data.
    tuning_data = normalize_sample_weights_per_location(tuning_data)


else:
    if use_test_data:
```

```
        train_data = train_set
        test_data = test_set
        print("Shape of test", test_data.shape[0])

# ensure sample weights for your training (or tuning) data sum to the number of␣
 ↪rows in the training (or tuning) data.
train_data = normalize_sample_weights_per_location(train_data)
if use_test_data:
    test_data = normalize_sample_weights_per_location(test_data)
```

[5]:
```
if run_analysis:
    import autogluon.eda.auto as auto
    auto.dataset_overview(train_data=train_data, test_data=test_data,␣
 ↪label="y", sample=None)
```

[6]:
```
if run_analysis:
    auto.target_analysis(train_data=train_data, label="y")
```

2 Starting

[7]:
```
import os


# Get the last submission number
last_submission_number = int(max([int(filename.split('_')[1].split('.')[0]) for␣
 ↪filename in os.listdir('submissions') if "submission" in filename]))
print("Last submission number:", last_submission_number)
print("Now creating submission number:", last_submission_number + 1)

# Create the new filename
new_filename = f'submission_{last_submission_number + 1}'

hello = os.environ.get('HELLO')
if hello is not None:
    new_filename += f'_{hello}'

print("New filename:", new_filename)
```

```
Last submission number: 87
Now creating submission number: 88
New filename: submission_88
```

[8]:
```
predictors = [None, None, None]
```

[9]:
```
def fit_predictor_for_location(loc):
    print(f"Training model for location {loc}...")
```

```
    # sum of sample weights for this location, and number of rows, for both␣
↪train and tune data and test data
    print("Train data sample weight sum:", train_data[train_data["location"] ==␣
↪loc]["sample_weight"].sum())
    print("Train data number of rows:", train_data[train_data["location"] ==␣
↪loc].shape[0])
    if use_tune_data:
        print("Tune data sample weight sum:",␣
↪tuning_data[tuning_data["location"] == loc]["sample_weight"].sum())
        print("Tune data number of rows:", tuning_data[tuning_data["location"]␣
↪== loc].shape[0])
    if use_test_data:
        print("Test data sample weight sum:", test_data[test_data["location"]␣
↪== loc]["sample_weight"].sum())
        print("Test data number of rows:", test_data[test_data["location"] ==␣
↪loc].shape[0])
    predictor = TabularPredictor(
        label=label,
        eval_metric=metric,
        path=f"AutogluonModels/{new_filename}_{loc}",
        sample_weight=sample_weight,
        weight_evaluation=weight_evaluation,
        groups="group" if use_groups else None,
    ).fit(
        train_data=train_data[train_data["location"] == loc],
        time_limit=time_limit,
        #presets=presets,
        num_stack_levels=num_stack_levels,
        num_bag_folds=num_bag_folds if not use_groups else 2,# just put␣
↪somethin, will be overwritten anyways
        tuning_data=tuning_data[tuning_data["location"] == loc] if␣
↪use_tune_data else None,
        use_bag_holdout=use_bag_holdout,
        holdout_frac=holdout_frac,
    )

    # evaluate on test data
    if use_test_data:
        # drop sample_weight column
        t = test_data[test_data["location"] == loc]#.
↪drop(columns=["sample_weight"])
        perf = predictor.evaluate(t)
        print("Evaluation on test data:")
        print(perf[predictor.eval_metric.name])

    return predictor
```

```
loc = "A"
predictors[0] = fit_predictor_for_location(loc)
```

```
Beginning AutoGluon training … Time limit = 14400s
AutoGluon will save models to "AutogluonModels/submission_88_A/"
AutoGluon Version:  0.8.2
Python Version:     3.10.12
Operating System:   Linux
Platform Machine:   x86_64
Platform Version:   #1 SMP Debian 5.10.197-1 (2023-09-29)
Disk Space Avail:   311.53 GB / 315.93 GB (98.6%)
Train Data Rows:    34061
Train Data Columns: 46
Label Column: y
Preprocessing data …
AutoGluon infers your prediction problem is: 'regression' (because dtype of
label-column == float and many unique label-values observed).
        Label info (max, min, mean, stddev): (5733.42, 0.0, 631.01116,
1166.20607)
        If 'regression' is not the correct problem_type, please manually specify
the problem_type parameter during predictor init (You may specify problem_type
as one of: ['binary', 'multiclass', 'regression'])
Using Feature Generators to preprocess the data …
Fitting AutoMLPipelineFeatureGenerator…
        Available Memory:                    132377.58 MB
        Train Data (Original)  Memory Usage: 14.24 MB (0.0% of available memory)
        Inferring data type of each feature based on column values. Set
feature_metadata_in to manually specify special dtypes of the features.
        Stage 1 Generators:
                Fitting AsTypeFeatureGenerator…
                        Note: Converting 4 features to boolean dtype as they
only contain 2 unique values.
        Stage 2 Generators:
                Fitting FillNaFeatureGenerator…
        Stage 3 Generators:
                Fitting IdentityFeatureGenerator…
        Stage 4 Generators:
                Fitting DropUniqueFeatureGenerator…

Training model for location A…
Train data sample weight sum: 34061
Train data number of rows: 34061

        Stage 5 Generators:
                Fitting DropDuplicatesFeatureGenerator…
        Useless Original Features (Count: 3): ['elevation:m', 'sample_weight',
'location']
                These features carry no predictive signal and should be manually
```

```
investigated.
                This is typically a feature which has the same value for all
rows.
                These features do not need to be present at inference time.
        Types of features in original data (raw dtype, special dtypes):
                ('float', []) : 42 | ['absolute_humidity_2m:gm3',
'air_density_2m:kgm3', 'ceiling_height_agl:m', 'clear_sky_energy_1h:J',
'clear_sky_rad:W', …]
                ('int', [])   :  1 | ['is_estimated']
        Types of features in processed data (raw dtype, special dtypes):
                ('float', [])     : 39 | ['absolute_humidity_2m:gm3',
'air_density_2m:kgm3', 'ceiling_height_agl:m', 'clear_sky_energy_1h:J',
'clear_sky_rad:W', …]
                ('int', ['bool']) :  4 | ['is_day:idx', 'is_in_shadow:idx',
'wind_speed_w_1000hPa:ms', 'is_estimated']
        0.2s = Fit runtime
        43 features in original data used to generate 43 features in processed
data.
        Train Data (Processed) Memory Usage: 10.76 MB (0.0% of available memory)
Data preprocessing and feature engineering runtime = 0.2s …
AutoGluon will gauge predictive performance using evaluation metric:
'mean_absolute_error'
        This metric's sign has been flipped to adhere to being higher_is_better.
The metric score can be multiplied by -1 to get the metric value.
        To change this, specify the eval_metric parameter of Predictor()
User-specified model hyperparameters to be fit:
{
        'NN_TORCH': {},
        'GBM': [{'extra_trees': True, 'ag_args': {'name_suffix': 'XT'}}, {},
'GBMLarge'],
        'CAT': {},
        'XGB': {},
        'FASTAI': {},
        'RF': [{'criterion': 'gini', 'ag_args': {'name_suffix': 'Gini',
'problem_types': ['binary', 'multiclass']}}, {'criterion': 'entropy', 'ag_args':
{'name_suffix': 'Entr', 'problem_types': ['binary', 'multiclass']}},
{'criterion': 'squared_error', 'ag_args': {'name_suffix': 'MSE',
'problem_types': ['regression', 'quantile']}}],
        'XT': [{'criterion': 'gini', 'ag_args': {'name_suffix': 'Gini',
'problem_types': ['binary', 'multiclass']}}, {'criterion': 'entropy', 'ag_args':
{'name_suffix': 'Entr', 'problem_types': ['binary', 'multiclass']}},
{'criterion': 'squared_error', 'ag_args': {'name_suffix': 'MSE',
'problem_types': ['regression', 'quantile']}}],
        'KNN': [{'weights': 'uniform', 'ag_args': {'name_suffix': 'Unif'}},
{'weights': 'distance', 'ag_args': {'name_suffix': 'Dist'}}],
}
AutoGluon will fit 4 stack levels (L1 to L4) …
Fitting 11 L1 models …
```

```
Fitting model: KNeighborsUnif_BAG_L1 … Training model for up to 4798.73s of
the 14399.79s of remaining time.
        -299.8964       = Validation score   (-mean_absolute_error)
        0.04s    = Training   runtime
        0.37s    = Validation runtime
Fitting model: KNeighborsDist_BAG_L1 … Training model for up to 4798.23s of
the 14399.3s of remaining time.
        -300.9352       = Validation score   (-mean_absolute_error)
        0.04s    = Training   runtime
        0.39s    = Validation runtime
Fitting model: LightGBMXT_BAG_L1 … Training model for up to 4797.76s of the
14398.82s of remaining time.
        Fitting 8 child models (S1F1 - S1F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -171.0109       = Validation score   (-mean_absolute_error)
        34.83s   = Training   runtime
        17.42s   = Validation runtime
Fitting model: LightGBM_BAG_L1 … Training model for up to 4755.49s of the
14356.55s of remaining time.
        Fitting 8 child models (S1F1 - S1F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -177.2785       = Validation score   (-mean_absolute_error)
        34.68s   = Training   runtime
        11.33s   = Validation runtime
Fitting model: RandomForestMSE_BAG_L1 … Training model for up to 4717.84s of
the 14318.9s of remaining time.
        -189.5336       = Validation score   (-mean_absolute_error)
        8.8s     = Training   runtime
        1.43s    = Validation runtime
Fitting model: CatBoost_BAG_L1 … Training model for up to 4706.94s of the
14308.0s of remaining time.
        Fitting 8 child models (S1F1 - S1F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -191.7407       = Validation score   (-mean_absolute_error)
        82.32s   = Training   runtime
        1.06s    = Validation runtime
Fitting model: XGBoost_BAG_L1 … Training model for up to 3856.13s of the
13457.19s of remaining time.
        Fitting 8 child models (S2F1 - S2F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -183.2782       = Validation score   (-mean_absolute_error)
        20.75s   = Training   runtime
        1.01s    = Validation runtime
Fitting model: NeuralNetTorch_BAG_L1 … Training model for up to 3845.45s of
the 13446.51s of remaining time.
        Fitting 8 child models (S2F1 - S2F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -179.1457       = Validation score   (-mean_absolute_error)
```

```
        827.05s  = Training   runtime
        0.41s    = Validation runtime
Fitting model: NeuralNetFastAI_BAG_L1 … Training model for up to 2696.9s of
the 12297.97s of remaining time.
        Fitting 8 child models (S4F1 - S4F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -190.3662        = Validation score   (-mean_absolute_error)
        165.12s  = Training   runtime
        2.07s    = Validation runtime
Fitting model: XGBoost_BAG_L1 … Training model for up to 2653.83s of the
12254.89s of remaining time.
        Fitting 8 child models (S4F1 - S4F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -181.2707        = Validation score   (-mean_absolute_error)
        138.08s  = Training   runtime
        4.29s    = Validation runtime
Fitting model: NeuralNetTorch_BAG_L1 … Training model for up to 2593.25s of
the 12194.31s of remaining time.
        Fitting 8 child models (S4F1 - S4F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -171.6047        = Validation score   (-mean_absolute_error)
        496.07s  = Training   runtime
        1.55s    = Validation runtime
Fitting model: LightGBMLarge_BAG_L1 … Training model for up to 2469.38s of the
12070.45s of remaining time.
        Fitting 8 child models (S4F1 - S4F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -167.9584        = Validation score   (-mean_absolute_error)
        447.83s  = Training   runtime
        93.82s   = Validation runtime
Repeating k-fold bagging: 5/20
Fitting model: LightGBMXT_BAG_L1 … Training model for up to 2349.46s of the
11950.53s of remaining time.
        Fitting 8 child models (S5F1 - S5F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -165.6732        = Validation score   (-mean_absolute_error)
        173.53s  = Training   runtime
        99.07s   = Validation runtime
Fitting model: LightGBM_BAG_L1 … Training model for up to 2310.01s of the
11911.08s of remaining time.
        Fitting 8 child models (S5F1 - S5F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -170.631         = Validation score   (-mean_absolute_error)
        176.33s  = Training   runtime
        58.62s   = Validation runtime
Fitting model: CatBoost_BAG_L1 … Training model for up to 2272.85s of the
11873.91s of remaining time.
        Fitting 8 child models (S5F1 - S5F8) | Fitting with
```

```
ParallelLocalFoldFittingStrategy
        -178.537        = Validation score   (-mean_absolute_error)
        1034.51s        = Training   runtime
        0.52s    = Validation runtime
Fitting model: NeuralNetFastAI_BAG_L1 … Training model for up to 2064.17s of
the 11665.24s of remaining time.
        Fitting 8 child models (S5F1 - S5F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -189.9303       = Validation score   (-mean_absolute_error)
        206.33s  = Training   runtime
        2.62s    = Validation runtime
Fitting model: XGBoost_BAG_L1 … Training model for up to 2021.69s of the
11622.75s of remaining time.
        Fitting 8 child models (S5F1 - S5F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -180.651        = Validation score   (-mean_absolute_error)
        153.3s   = Training   runtime
        5.01s    = Validation runtime
Fitting model: NeuralNetTorch_BAG_L1 … Training model for up to 2004.83s of
the 11605.89s of remaining time.
        Fitting 8 child models (S5F1 - S5F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -171.157        = Validation score   (-mean_absolute_error)
        637.75s  = Training   runtime
        1.96s    = Validation runtime
Fitting model: LightGBMLarge_BAG_L1 … Training model for up to 1861.96s of the
11463.02s of remaining time.
        Fitting 8 child models (S5F1 - S5F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -167.6439       = Validation score   (-mean_absolute_error)
        558.8s   = Training   runtime
        118.07s  = Validation runtime
Repeating k-fold bagging: 6/20
Fitting model: LightGBMXT_BAG_L1 … Training model for up to 1745.1s of the
11346.16s of remaining time.
        Fitting 8 child models (S6F1 - S6F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -165.3347       = Validation score   (-mean_absolute_error)
        208.46s  = Training   runtime
        116.17s  = Validation runtime
Fitting model: LightGBM_BAG_L1 … Training model for up to 1706.44s of the
11307.51s of remaining time.
        Fitting 8 child models (S6F1 - S6F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -170.3388       = Validation score   (-mean_absolute_error)
        211.22s  = Training   runtime
        67.89s   = Validation runtime
Fitting model: CatBoost_BAG_L1 … Training model for up to 1668.5s of the
```

```
11269.56s of remaining time.
        Fitting 8 child models (S6F1 - S6F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -178.1899       = Validation score   (-mean_absolute_error)
        1241.82s        = Training   runtime
        0.62s    = Validation runtime
Fitting model: NeuralNetFastAI_BAG_L1 … Training model for up to 1459.95s of
the 11061.01s of remaining time.
        Fitting 8 child models (S6F1 - S6F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -189.4668       = Validation score   (-mean_absolute_error)
        247.9s   = Training   runtime
        3.19s    = Validation runtime
Fitting model: XGBoost_BAG_L1 … Training model for up to 1417.12s of the
11018.18s of remaining time.
        Fitting 8 child models (S6F1 - S6F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -180.1776       = Validation score   (-mean_absolute_error)
        214.34s  = Training   runtime
        8.23s    = Validation runtime
Fitting model: NeuralNetTorch_BAG_L1 … Training model for up to 1353.18s of
the 10954.24s of remaining time.
        Fitting 8 child models (S6F1 - S6F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -170.6393       = Validation score   (-mean_absolute_error)
        773.7s   = Training   runtime
        2.35s    = Validation runtime
Fitting model: LightGBMLarge_BAG_L1 … Training model for up to 1215.94s of the
10817.01s of remaining time.
        Fitting 8 child models (S6F1 - S6F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -167.4456       = Validation score   (-mean_absolute_error)
        669.87s  = Training   runtime
        145.65s  = Validation runtime
Repeating k-fold bagging: 7/20
Fitting model: LightGBMXT_BAG_L1 … Training model for up to 1099.59s of the
10700.65s of remaining time.
        Fitting 8 child models (S7F1 - S7F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -165.2208       = Validation score   (-mean_absolute_error)
        242.26s  = Training   runtime
        131.89s  = Validation runtime
Fitting model: LightGBM_BAG_L1 … Training model for up to 1062.05s of the
10663.11s of remaining time.
        Fitting 8 child models (S7F1 - S7F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -170.1685       = Validation score   (-mean_absolute_error)
        243.34s  = Training   runtime
```

```
        77.06s   = Validation runtime
Fitting model: CatBoost_BAG_L1 … Training model for up to 1026.8s of the
10627.86s of remaining time.
        Fitting 8 child models (S7F1 - S7F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -177.8946        = Validation score   (-mean_absolute_error)
        1450.57s         = Training   runtime
        0.73s    = Validation runtime
Fitting model: NeuralNetFastAI_BAG_L1 … Training model for up to 816.83s of
the 10417.89s of remaining time.
        Fitting 8 child models (S7F1 - S7F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -189.4133        = Validation score   (-mean_absolute_error)
        289.44s  = Training   runtime
        3.72s    = Validation runtime
Fitting model: XGBoost_BAG_L1 … Training model for up to 773.97s of the
10375.04s of remaining time.
        Fitting 8 child models (S7F1 - S7F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -179.9572        = Validation score   (-mean_absolute_error)
        229.4s   = Training   runtime
        8.8s     = Validation runtime
Fitting model: NeuralNetTorch_BAG_L1 … Training model for up to 757.36s of the
10358.42s of remaining time.
        Fitting 8 child models (S7F1 - S7F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -170.661         = Validation score   (-mean_absolute_error)
        889.9s   = Training   runtime
        2.76s    = Validation runtime
Fitting model: LightGBMLarge_BAG_L1 … Training model for up to 639.85s of the
10240.91s of remaining time.
        Fitting 8 child models (S7F1 - S7F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -167.3049        = Validation score   (-mean_absolute_error)
        780.54s  = Training   runtime
        173.73s  = Validation runtime
Completed 7/20 k-fold bagging repeats …
Fitting model: WeightedEnsemble_L2 … Training model for up to 479.87s of the
10124.76s of remaining time.
        -160.8308        = Validation score   (-mean_absolute_error)
        0.71s    = Training   runtime
        0.0s     = Validation runtime
Fitting 9 L2 models …
Fitting model: LightGBMXT_BAG_L2 … Training model for up to 4498.45s of the
10124.02s of remaining time.
        Fitting 8 child models (S1F1 - S1F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -164.6311        = Validation score   (-mean_absolute_error)
```

```
        2.95s    = Training   runtime
        0.17s    = Validation runtime
Fitting model: LightGBM_BAG_L2 … Training model for up to 4494.24s of the
10119.82s of remaining time.
        Fitting 8 child models (S1F1 - S1F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -160.812         = Validation score   (-mean_absolute_error)
        2.15s    = Training   runtime
        0.09s    = Validation runtime
Fitting model: RandomForestMSE_BAG_L2 … Training model for up to 4490.87s of
the 10116.45s of remaining time.
        -159.7154        = Validation score   (-mean_absolute_error)
        15.63s   = Training   runtime
        1.47s    = Validation runtime
Fitting model: CatBoost_BAG_L2 … Training model for up to 4473.09s of the
10098.67s of remaining time.
        Fitting 8 child models (S1F1 - S1F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -161.6861        = Validation score   (-mean_absolute_error)
        6.53s    = Training   runtime
        0.04s    = Validation runtime
Fitting model: ExtraTreesMSE_BAG_L2 … Training model for up to 4465.36s of the
10090.94s of remaining time.
        -159.1382        = Validation score   (-mean_absolute_error)
        2.75s    = Training   runtime
        1.49s    = Validation runtime
Fitting model: NeuralNetFastAI_BAG_L2 … Training model for up to 4460.42s of
the 10086.0s of remaining time.
        Fitting 8 child models (S1F1 - S1F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -158.829         = Validation score   (-mean_absolute_error)
        42.05s   = Training   runtime
        0.55s    = Validation runtime
Fitting model: XGBoost_BAG_L2 … Training model for up to 4417.05s of the
10042.63s of remaining time.
        Fitting 8 child models (S1F1 - S1F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -160.0917        = Validation score   (-mean_absolute_error)
        3.0s     = Training   runtime
        0.14s    = Validation runtime
Fitting model: NeuralNetTorch_BAG_L2 … Training model for up to 4412.69s of
the 10038.27s of remaining time.
        Fitting 8 child models (S1F1 - S1F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -162.4177        = Validation score   (-mean_absolute_error)
        59.17s   = Training   runtime
        0.66s    = Validation runtime
Fitting model: LightGBMLarge_BAG_L2 … Training model for up to 4352.06s of the
```

```
9977.64s of remaining time.
        Fitting 8 child models (S1F1 - S1F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -161.5453       = Validation score   (-mean_absolute_error)
        6.25s    = Training   runtime
        0.21s    = Validation runtime
Repeating k-fold bagging: 2/20
Fitting model: LightGBMXT_BAG_L2 … Training model for up to 4344.53s of the
9970.11s of remaining time.
        Fitting 8 child models (S2F1 - S2F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -163.852        = Validation score   (-mean_absolute_error)
        5.75s    = Training   runtime
        0.35s    = Validation runtime
Fitting model: LightGBM_BAG_L2 … Training model for up to 4340.34s of the
9965.91s of remaining time.
        Fitting 8 child models (S2F1 - S2F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -159.9879       = Validation score   (-mean_absolute_error)
        4.16s    = Training   runtime
        0.17s    = Validation runtime
Fitting model: CatBoost_BAG_L2 … Training model for up to 4337.16s of the
9962.74s of remaining time.
        Fitting 8 child models (S2F1 - S2F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -161.33  = Validation score   (-mean_absolute_error)
        13.02s   = Training   runtime
        0.08s    = Validation runtime
Fitting model: NeuralNetFastAI_BAG_L2 … Training model for up to 4329.35s of
the 9954.92s of remaining time.
        Fitting 8 child models (S2F1 - S2F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -157.5807       = Validation score   (-mean_absolute_error)
        84.31s   = Training   runtime
        1.11s    = Validation runtime
Fitting model: XGBoost_BAG_L2 … Training model for up to 4285.83s of the
9911.41s of remaining time.
        Fitting 8 child models (S2F1 - S2F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -159.1092       = Validation score   (-mean_absolute_error)
        6.04s    = Training   runtime
        0.27s    = Validation runtime
Fitting model: NeuralNetTorch_BAG_L2 … Training model for up to 4281.55s of
the 9907.12s of remaining time.
        Fitting 8 child models (S2F1 - S2F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -161.386        = Validation score   (-mean_absolute_error)
        105.85s  = Training   runtime
```

```
        1.25s    = Validation runtime
Fitting model: LightGBMLarge_BAG_L2 … Training model for up to 4233.45s of the
9859.03s of remaining time.
        Fitting 8 child models (S2F1 - S2F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -160.2017        = Validation score   (-mean_absolute_error)
        12.59s   = Training   runtime
        0.4s     = Validation runtime
Repeating k-fold bagging: 3/20
Fitting model: LightGBMXT_BAG_L2 … Training model for up to 4225.75s of the
9851.33s of remaining time.
        Fitting 8 child models (S3F1 - S3F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -163.7757        = Validation score   (-mean_absolute_error)
        8.88s    = Training   runtime
        0.52s    = Validation runtime
Fitting model: LightGBM_BAG_L2 … Training model for up to 4221.37s of the
9846.94s of remaining time.
        Fitting 8 child models (S3F1 - S3F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -159.7155        = Validation score   (-mean_absolute_error)
        6.13s    = Training   runtime
        0.26s    = Validation runtime
Fitting model: CatBoost_BAG_L2 … Training model for up to 4218.09s of the
9843.67s of remaining time.
        Fitting 8 child models (S3F1 - S3F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -161.1084        = Validation score   (-mean_absolute_error)
        19.47s   = Training   runtime
        0.13s    = Validation runtime
Fitting model: NeuralNetFastAI_BAG_L2 … Training model for up to 4210.38s of
the 9835.96s of remaining time.
        Fitting 8 child models (S3F1 - S3F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -157.1806        = Validation score   (-mean_absolute_error)
        125.88s  = Training   runtime
        1.64s    = Validation runtime
Fitting model: XGBoost_BAG_L2 … Training model for up to 4167.53s of the
9793.11s of remaining time.
        Fitting 8 child models (S3F1 - S3F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -158.6159        = Validation score   (-mean_absolute_error)
        9.34s    = Training   runtime
        0.4s     = Validation runtime
Fitting model: NeuralNetTorch_BAG_L2 … Training model for up to 4162.84s of
the 9788.41s of remaining time.
        Fitting 8 child models (S3F1 - S3F8) | Fitting with
ParallelLocalFoldFittingStrategy
```

```
        -161.0693       = Validation score   (-mean_absolute_error)
        163.75s  = Training   runtime
        1.82s    = Validation runtime
Fitting model: LightGBMLarge_BAG_L2 … Training model for up to 4103.5s of the
9729.07s of remaining time.
        Fitting 8 child models (S3F1 - S3F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -159.6669       = Validation score   (-mean_absolute_error)
        18.43s   = Training   runtime
        0.6s     = Validation runtime
Repeating k-fold bagging: 4/20
Fitting model: LightGBMXT_BAG_L2 … Training model for up to 4096.23s of the
9721.8s of remaining time.
        Fitting 8 child models (S4F1 - S4F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -163.7133       = Validation score   (-mean_absolute_error)
        11.69s   = Training   runtime
        0.71s    = Validation runtime
Fitting model: LightGBM_BAG_L2 … Training model for up to 4092.16s of the
9717.73s of remaining time.
        Fitting 8 child models (S4F1 - S4F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -159.709        = Validation score   (-mean_absolute_error)
        8.0s     = Training   runtime
        0.35s    = Validation runtime
Fitting model: CatBoost_BAG_L2 … Training model for up to 4088.96s of the
9714.54s of remaining time.
        Fitting 8 child models (S4F1 - S4F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -161.1191       = Validation score   (-mean_absolute_error)
        25.6s    = Training   runtime
        0.17s    = Validation runtime
Fitting model: NeuralNetFastAI_BAG_L2 … Training model for up to 4081.58s of
the 9707.16s of remaining time.
        Fitting 8 child models (S4F1 - S4F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -157.0605       = Validation score   (-mean_absolute_error)
        168.02s  = Training   runtime
        2.2s     = Validation runtime
Fitting model: XGBoost_BAG_L2 … Training model for up to 4038.07s of the
9663.65s of remaining time.
        Fitting 8 child models (S4F1 - S4F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -158.658        = Validation score   (-mean_absolute_error)
        12.36s   = Training   runtime
        0.52s    = Validation runtime
Fitting model: NeuralNetTorch_BAG_L2 … Training model for up to 4033.83s of
the 9659.41s of remaining time.
```

```
        Fitting 8 child models (S4F1 - S4F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -160.7582       = Validation score   (-mean_absolute_error)
        216.63s  = Training   runtime
        2.39s    = Validation runtime
Fitting model: LightGBMLarge_BAG_L2 … Training model for up to 3979.48s of the
9605.06s of remaining time.
        Fitting 8 child models (S4F1 - S4F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -159.5758       = Validation score   (-mean_absolute_error)
        23.92s   = Training   runtime
        0.78s    = Validation runtime
Repeating k-fold bagging: 5/20
Fitting model: LightGBMXT_BAG_L2 … Training model for up to 3972.64s of the
9598.21s of remaining time.
        Fitting 8 child models (S5F1 - S5F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -163.7242       = Validation score   (-mean_absolute_error)
        14.59s   = Training   runtime
        0.88s    = Validation runtime
Fitting model: LightGBM_BAG_L2 … Training model for up to 3968.42s of the
9594.0s of remaining time.
        Fitting 8 child models (S5F1 - S5F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -159.5618       = Validation score   (-mean_absolute_error)
        10.02s   = Training   runtime
        0.44s    = Validation runtime
Fitting model: CatBoost_BAG_L2 … Training model for up to 3965.06s of the
9590.64s of remaining time.
        Fitting 8 child models (S5F1 - S5F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -161.1053       = Validation score   (-mean_absolute_error)
        31.13s   = Training   runtime
        0.21s    = Validation runtime
Fitting model: NeuralNetFastAI_BAG_L2 … Training model for up to 3958.19s of
the 9583.77s of remaining time.
        Fitting 8 child models (S5F1 - S5F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -156.9118       = Validation score   (-mean_absolute_error)
        210.73s  = Training   runtime
        2.74s    = Validation runtime
Fitting model: XGBoost_BAG_L2 … Training model for up to 3914.14s of the
9539.72s of remaining time.
        Fitting 8 child models (S5F1 - S5F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -158.6222       = Validation score   (-mean_absolute_error)
        15.4s    = Training   runtime
        0.65s    = Validation runtime
```

```
Fitting model: NeuralNetTorch_BAG_L2 … Training model for up to 3909.75s of
the 9535.33s of remaining time.
        Fitting 8 child models (S5F1 - S5F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -160.685         = Validation score   (-mean_absolute_error)
        273.01s  = Training   runtime
        2.93s    = Validation runtime
Fitting model: LightGBMLarge_BAG_L2 … Training model for up to 3852.09s of the
9477.67s of remaining time.
        Fitting 8 child models (S5F1 - S5F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -159.4177        = Validation score   (-mean_absolute_error)
        29.93s   = Training   runtime
        1.0s     = Validation runtime
Repeating k-fold bagging: 6/20
Fitting model: LightGBMXT_BAG_L2 … Training model for up to 3844.79s of the
9470.37s of remaining time.
        Fitting 8 child models (S6F1 - S6F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -163.5889        = Validation score   (-mean_absolute_error)
        17.86s   = Training   runtime
        1.07s    = Validation runtime
Fitting model: LightGBM_BAG_L2 … Training model for up to 3840.26s of the
9465.84s of remaining time.
        Fitting 8 child models (S6F1 - S6F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -159.5445        = Validation score   (-mean_absolute_error)
        12.07s   = Training   runtime
        0.53s    = Validation runtime
Fitting model: CatBoost_BAG_L2 … Training model for up to 3836.98s of the
9462.55s of remaining time.
        Fitting 8 child models (S6F1 - S6F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -161.0621        = Validation score   (-mean_absolute_error)
        36.98s   = Training   runtime
        0.25s    = Validation runtime
Fitting model: NeuralNetFastAI_BAG_L2 … Training model for up to 3829.94s of
the 9455.52s of remaining time.
        Fitting 8 child models (S6F1 - S6F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -156.8137        = Validation score   (-mean_absolute_error)
        252.03s  = Training   runtime
        3.27s    = Validation runtime
Fitting model: XGBoost_BAG_L2 … Training model for up to 3787.3s of the
9412.88s of remaining time.
        Fitting 8 child models (S6F1 - S6F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -158.7497        = Validation score   (-mean_absolute_error)
```

```
        18.4s    = Training   runtime
        0.77s    = Validation runtime
Fitting model: NeuralNetTorch_BAG_L2 … Training model for up to 3783.02s of
the 9408.6s of remaining time.
        Fitting 8 child models (S6F1 - S6F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -160.6362        = Validation score   (-mean_absolute_error)
        324.9s   = Training   runtime
        3.53s    = Validation runtime
Fitting model: LightGBMLarge_BAG_L2 … Training model for up to 3729.74s of the
9355.32s of remaining time.
        Fitting 8 child models (S6F1 - S6F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -159.3791        = Validation score   (-mean_absolute_error)
        35.5s    = Training   runtime
        1.18s    = Validation runtime
Repeating k-fold bagging: 7/20
Fitting model: LightGBMXT_BAG_L2 … Training model for up to 3722.9s of the
9348.47s of remaining time.
        Fitting 8 child models (S7F1 - S7F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -163.6665        = Validation score   (-mean_absolute_error)
        21.21s   = Training   runtime
        1.23s    = Validation runtime
Fitting model: LightGBM_BAG_L2 … Training model for up to 3718.22s of the
9343.8s of remaining time.
        Fitting 8 child models (S7F1 - S7F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -159.5605        = Validation score   (-mean_absolute_error)
        14.02s   = Training   runtime
        0.61s    = Validation runtime
Fitting model: CatBoost_BAG_L2 … Training model for up to 3715.07s of the
9340.65s of remaining time.
        Fitting 8 child models (S7F1 - S7F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -161.0297        = Validation score   (-mean_absolute_error)
        43.9s    = Training   runtime
        0.29s    = Validation runtime
Fitting model: NeuralNetFastAI_BAG_L2 … Training model for up to 3706.95s of
the 9332.53s of remaining time.
        Fitting 8 child models (S7F1 - S7F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -156.7265        = Validation score   (-mean_absolute_error)
        293.63s  = Training   runtime
        3.82s    = Validation runtime
Fitting model: XGBoost_BAG_L2 … Training model for up to 3663.99s of the
9289.57s of remaining time.
        Fitting 8 child models (S7F1 - S7F8) | Fitting with
```

```
ParallelLocalFoldFittingStrategy
        -158.7597       = Validation score   (-mean_absolute_error)
        21.32s   = Training   runtime
        0.9s     = Validation runtime
Fitting model: NeuralNetTorch_BAG_L2 … Training model for up to 3659.73s of
the 9285.31s of remaining time.
        Fitting 8 child models (S7F1 - S7F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -160.5765       = Validation score   (-mean_absolute_error)
        376.33s  = Training   runtime
        4.11s    = Validation runtime
Fitting model: LightGBMLarge_BAG_L2 … Training model for up to 3607.02s of the
9232.6s of remaining time.
        Fitting 8 child models (S7F1 - S7F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -159.3657       = Validation score   (-mean_absolute_error)
        41.32s   = Training   runtime
        1.36s    = Validation runtime
Repeating k-fold bagging: 8/20
Fitting model: LightGBMXT_BAG_L2 … Training model for up to 3599.91s of the
9225.49s of remaining time.
        Fitting 8 child models (S8F1 - S8F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -163.704        = Validation score   (-mean_absolute_error)
        24.13s   = Training   runtime
        1.39s    = Validation runtime
Fitting model: LightGBM_BAG_L2 … Training model for up to 3595.75s of the
9221.33s of remaining time.
        Fitting 8 child models (S8F1 - S8F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -159.5321       = Validation score   (-mean_absolute_error)
        16.05s   = Training   runtime
        0.7s     = Validation runtime
Fitting model: CatBoost_BAG_L2 … Training model for up to 3592.4s of the
9217.98s of remaining time.
        Fitting 8 child models (S8F1 - S8F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -160.9891       = Validation score   (-mean_absolute_error)
        51.89s   = Training   runtime
        0.32s    = Validation runtime
Fitting model: NeuralNetFastAI_BAG_L2 … Training model for up to 3582.98s of
the 9208.56s of remaining time.
        Fitting 8 child models (S8F1 - S8F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -156.6687       = Validation score   (-mean_absolute_error)
        335.33s  = Training   runtime
        4.36s    = Validation runtime
Fitting model: XGBoost_BAG_L2 … Training model for up to 3539.93s of the
```

```
9165.5s of remaining time.
        Fitting 8 child models (S8F1 - S8F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -158.7319       = Validation score   (-mean_absolute_error)
        24.34s   = Training   runtime
        1.02s    = Validation runtime
Fitting model: NeuralNetTorch_BAG_L2 … Training model for up to 3535.54s of
the 9161.11s of remaining time.
        Fitting 8 child models (S8F1 - S8F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -160.5476       = Validation score   (-mean_absolute_error)
        427.84s  = Training   runtime
        4.79s    = Validation runtime
Fitting model: LightGBMLarge_BAG_L2 … Training model for up to 3482.69s of the
9108.27s of remaining time.
        Fitting 8 child models (S8F1 - S8F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -159.2315       = Validation score   (-mean_absolute_error)
        47.26s   = Training   runtime
        1.55s    = Validation runtime
Repeating k-fold bagging: 9/20
Fitting model: LightGBMXT_BAG_L2 … Training model for up to 3475.44s of the
9101.02s of remaining time.
        Fitting 8 child models (S9F1 - S9F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -163.7176       = Validation score   (-mean_absolute_error)
        26.86s   = Training   runtime
        1.59s    = Validation runtime
Fitting model: LightGBM_BAG_L2 … Training model for up to 3471.26s of the
9096.84s of remaining time.
        Fitting 8 child models (S9F1 - S9F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -159.5417       = Validation score   (-mean_absolute_error)
        17.9s    = Training   runtime
        0.78s    = Validation runtime
Fitting model: CatBoost_BAG_L2 … Training model for up to 3468.08s of the
9093.66s of remaining time.
        Fitting 8 child models (S9F1 - S9F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -160.9541       = Validation score   (-mean_absolute_error)
        58.48s   = Training   runtime
        0.36s    = Validation runtime
Fitting model: NeuralNetFastAI_BAG_L2 … Training model for up to 3460.1s of
the 9085.67s of remaining time.
        Fitting 8 child models (S9F1 - S9F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -156.6534       = Validation score   (-mean_absolute_error)
        377.12s  = Training   runtime
```

```
        4.9s     = Validation runtime
Fitting model: XGBoost_BAG_L2 … Training model for up to 3416.95s of the
9042.53s of remaining time.
        Fitting 8 child models (S9F1 - S9F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -158.698         = Validation score   (-mean_absolute_error)
        27.52s   = Training   runtime
        1.16s    = Validation runtime
Fitting model: NeuralNetTorch_BAG_L2 … Training model for up to 3412.27s of
the 9037.85s of remaining time.
        Fitting 8 child models (S9F1 - S9F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -160.498         = Validation score   (-mean_absolute_error)
        480.82s  = Training   runtime
        5.42s    = Validation runtime
Fitting model: LightGBMLarge_BAG_L2 … Training model for up to 3357.9s of the
8983.48s of remaining time.
        Fitting 8 child models (S9F1 - S9F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -159.2158        = Validation score   (-mean_absolute_error)
        52.8s    = Training   runtime
        1.73s    = Validation runtime
Repeating k-fold bagging: 10/20
Fitting model: LightGBMXT_BAG_L2 … Training model for up to 3351.04s of the
8976.61s of remaining time.
        Fitting 8 child models (S10F1 - S10F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -163.6294        = Validation score   (-mean_absolute_error)
        30.31s   = Training   runtime
        1.83s    = Validation runtime
Fitting model: LightGBM_BAG_L2 … Training model for up to 3346.26s of the
8971.84s of remaining time.
        Fitting 8 child models (S10F1 - S10F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -159.4705        = Validation score   (-mean_absolute_error)
        19.86s   = Training   runtime
        0.88s    = Validation runtime
Fitting model: CatBoost_BAG_L2 … Training model for up to 3342.92s of the
8968.5s of remaining time.
        Fitting 8 child models (S10F1 - S10F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -160.8543        = Validation score   (-mean_absolute_error)
        66.09s   = Training   runtime
        0.4s     = Validation runtime
Fitting model: NeuralNetFastAI_BAG_L2 … Training model for up to 3333.93s of
the 8959.51s of remaining time.
        Fitting 8 child models (S10F1 - S10F8) | Fitting with
ParallelLocalFoldFittingStrategy
```

```
        -156.6076       = Validation score   (-mean_absolute_error)
        419.57s  = Training   runtime
        5.43s    = Validation runtime
Fitting model: XGBoost_BAG_L2 … Training model for up to 3290.19s of the
8915.76s of remaining time.
        Fitting 8 child models (S10F1 - S10F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -158.6029       = Validation score   (-mean_absolute_error)
        30.53s   = Training   runtime
        1.28s    = Validation runtime
Fitting model: NeuralNetTorch_BAG_L2 … Training model for up to 3285.82s of
the 8911.4s of remaining time.
        Fitting 8 child models (S10F1 - S10F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -160.4988       = Validation score   (-mean_absolute_error)
        530.72s  = Training   runtime
        5.96s    = Validation runtime
Fitting model: LightGBMLarge_BAG_L2 … Training model for up to 3234.45s of the
8860.03s of remaining time.
        Fitting 8 child models (S10F1 - S10F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -159.1689       = Validation score   (-mean_absolute_error)
        58.96s   = Training   runtime
        1.91s    = Validation runtime
Repeating k-fold bagging: 11/20
Fitting model: LightGBMXT_BAG_L2 … Training model for up to 3227.02s of the
8852.59s of remaining time.
        Fitting 8 child models (S11F1 - S11F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -163.612        = Validation score   (-mean_absolute_error)
        33.57s   = Training   runtime
        2.02s    = Validation runtime
Fitting model: LightGBM_BAG_L2 … Training model for up to 3222.31s of the
8847.88s of remaining time.
        Fitting 8 child models (S11F1 - S11F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -159.4274       = Validation score   (-mean_absolute_error)
        21.93s   = Training   runtime
        0.96s    = Validation runtime
Fitting model: CatBoost_BAG_L2 … Training model for up to 3218.84s of the
8844.42s of remaining time.
        Fitting 8 child models (S11F1 - S11F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -160.8316       = Validation score   (-mean_absolute_error)
        72.36s   = Training   runtime
        0.44s    = Validation runtime
Fitting model: NeuralNetFastAI_BAG_L2 … Training model for up to 3211.15s of
the 8836.72s of remaining time.
```

```
        Fitting 8 child models (S11F1 - S11F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -158.9933       = Validation score   (-mean_absolute_error)
        1.91s    = Training   runtime
        0.08s    = Validation runtime
Fitting model: RandomForestMSE_BAG_L3 … Training model for up to 5051.84s of
the 7582.77s of remaining time.
        -157.77  = Validation score   (-mean_absolute_error)
        14.82s   = Training   runtime
        1.46s    = Validation runtime
Fitting model: CatBoost_BAG_L3 … Training model for up to 5034.86s of the
7565.8s of remaining time.
        Fitting 8 child models (S1F1 - S1F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -159.1315       = Validation score   (-mean_absolute_error)
        3.81s    = Training   runtime
        0.04s    = Validation runtime
Fitting model: ExtraTreesMSE_BAG_L3 … Training model for up to 5029.82s of the
7560.76s of remaining time.
        -158.6069       = Validation score   (-mean_absolute_error)
        2.91s    = Training   runtime
        1.47s    = Validation runtime
Fitting model: NeuralNetFastAI_BAG_L3 … Training model for up to 5024.75s of
the 7555.68s of remaining time.
        Fitting 8 child models (S1F1 - S1F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -157.0005       = Validation score   (-mean_absolute_error)
        41.51s   = Training   runtime
        0.54s    = Validation runtime
Fitting model: XGBoost_BAG_L3 … Training model for up to 4981.96s of the
7512.89s of remaining time.
        Fitting 8 child models (S1F1 - S1F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -158.0741       = Validation score   (-mean_absolute_error)
        2.73s    = Training   runtime
        0.12s    = Validation runtime
Fitting model: NeuralNetTorch_BAG_L3 … Training model for up to 4977.82s of
the 7508.76s of remaining time.
        Fitting 8 child models (S1F1 - S1F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -156.5955       = Validation score   (-mean_absolute_error)
        492.06s  = Training   runtime
        5.98s    = Validation runtime
Fitting model: LightGBMLarge_BAG_L3 … Training model for up to 3813.26s of the
6344.19s of remaining time.
        Fitting 8 child models (S11F1 - S11F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -157.9657       = Validation score   (-mean_absolute_error)
```

```
        61.44s   = Training   runtime
        1.97s    = Validation runtime
Repeating k-fold bagging: 12/20
Fitting model: LightGBMXT_BAG_L3 … Training model for up to 3806.51s of the
6337.45s of remaining time.
        Fitting 8 child models (S12F1 - S12F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -160.6992        = Validation score   (-mean_absolute_error)
        21.92s   = Training   runtime
        1.18s    = Validation runtime
Fitting model: LightGBM_BAG_L3 … Training model for up to 3803.23s of the
6334.17s of remaining time.
        Fitting 8 child models (S12F1 - S12F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -157.99  = Validation score   (-mean_absolute_error)
        22.78s   = Training   runtime
        0.98s    = Validation runtime
Fitting model: CatBoost_BAG_L3 … Training model for up to 3800.01s of the
6330.95s of remaining time.
        Fitting 8 child models (S12F1 - S12F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -158.6154        = Validation score   (-mean_absolute_error)
        50.16s   = Training   runtime
        0.45s    = Validation runtime
Fitting model: NeuralNetFastAI_BAG_L3 … Training model for up to 3791.05s of
the 6321.98s of remaining time.
        Fitting 8 child models (S12F1 - S12F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -155.2689        = Validation score   (-mean_absolute_error)
        500.17s  = Training   runtime
        6.42s    = Validation runtime
Fitting model: XGBoost_BAG_L3 … Training model for up to 3748.33s of the
6279.26s of remaining time.
        Fitting 8 child models (S12F1 - S12F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -156.9601        = Validation score   (-mean_absolute_error)
        33.15s   = Training   runtime
        1.38s    = Validation runtime
Fitting model: NeuralNetTorch_BAG_L3 … Training model for up to 3743.88s of
the 6274.82s of remaining time.
        Fitting 8 child models (S12F1 - S12F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -156.5645        = Validation score   (-mean_absolute_error)
        531.82s  = Training   runtime
        6.55s    = Validation runtime
Fitting model: LightGBMLarge_BAG_L3 … Training model for up to 3702.62s of the
6233.55s of remaining time.
        Fitting 8 child models (S12F1 - S12F8) | Fitting with
```

```
ParallelLocalFoldFittingStrategy
        -157.9609       = Validation score   (-mean_absolute_error)
        67.64s   = Training   runtime
        2.17s    = Validation runtime
Repeating k-fold bagging: 13/20
Fitting model: LightGBMXT_BAG_L3 … Training model for up to 3695.06s of the
6225.99s of remaining time.
        Fitting 8 child models (S13F1 - S13F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -160.7016       = Validation score   (-mean_absolute_error)
        23.77s   = Training   runtime
        1.28s    = Validation runtime
Fitting model: LightGBM_BAG_L3 … Training model for up to 3691.88s of the
6222.82s of remaining time.
        Fitting 8 child models (S13F1 - S13F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -157.9853       = Validation score   (-mean_absolute_error)
        24.69s   = Training   runtime
        1.06s    = Validation runtime
Fitting model: CatBoost_BAG_L3 … Training model for up to 3688.57s of the
6219.51s of remaining time.
        Fitting 8 child models (S13F1 - S13F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -158.6202       = Validation score   (-mean_absolute_error)
        54.24s   = Training   runtime
        0.48s    = Validation runtime
Fitting model: NeuralNetFastAI_BAG_L3 … Training model for up to 3683.2s of
the 6214.14s of remaining time.
        Fitting 8 child models (S13F1 - S13F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -155.2104       = Validation score   (-mean_absolute_error)
        541.67s  = Training   runtime
        6.97s    = Validation runtime
Fitting model: XGBoost_BAG_L3 … Training model for up to 3640.25s of the
6171.18s of remaining time.
        Fitting 8 child models (S13F1 - S13F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -156.9527       = Validation score   (-mean_absolute_error)
        35.83s   = Training   runtime
        1.49s    = Validation runtime
Fitting model: NeuralNetTorch_BAG_L3 … Training model for up to 3636.25s of
the 6167.18s of remaining time.
        Fitting 8 child models (S13F1 - S13F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -156.5736       = Validation score   (-mean_absolute_error)
        576.11s  = Training   runtime
        7.07s    = Validation runtime
Fitting model: LightGBMLarge_BAG_L3 … Training model for up to 3590.64s of the
```

```
6121.57s of remaining time.
        Fitting 8 child models (S13F1 - S13F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -157.9201       = Validation score   (-mean_absolute_error)
        73.16s   = Training   runtime
        2.35s    = Validation runtime
Repeating k-fold bagging: 14/20
Fitting model: LightGBMXT_BAG_L3 … Training model for up to 3583.76s of the
6114.69s of remaining time.
        Fitting 8 child models (S14F1 - S14F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -160.7028       = Validation score   (-mean_absolute_error)
        25.67s   = Training   runtime
        1.38s    = Validation runtime
Fitting model: LightGBM_BAG_L3 … Training model for up to 3580.58s of the
6111.51s of remaining time.
        Fitting 8 child models (S14F1 - S14F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -157.9824       = Validation score   (-mean_absolute_error)
        26.72s   = Training   runtime
        1.15s    = Validation runtime
Fitting model: CatBoost_BAG_L3 … Training model for up to 3577.26s of the
6108.2s of remaining time.
        Fitting 8 child models (S14F1 - S14F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -158.6264       = Validation score   (-mean_absolute_error)
        58.26s   = Training   runtime
        0.52s    = Validation runtime
Fitting model: NeuralNetFastAI_BAG_L3 … Training model for up to 3571.91s of
the 6102.85s of remaining time.
        Fitting 8 child models (S14F1 - S14F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -155.1889       = Validation score   (-mean_absolute_error)
        583.41s  = Training   runtime
        7.49s    = Validation runtime
Fitting model: XGBoost_BAG_L3 … Training model for up to 3528.59s of the
6059.52s of remaining time.
        Fitting 8 child models (S14F1 - S14F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -156.9858       = Validation score   (-mean_absolute_error)
        38.5s    = Training   runtime
        1.61s    = Validation runtime
Fitting model: NeuralNetTorch_BAG_L3 … Training model for up to 3524.66s of
the 6055.59s of remaining time.
        Fitting 8 child models (S14F1 - S14F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -156.552        = Validation score   (-mean_absolute_error)
        620.2s   = Training   runtime
```

```
        7.65s    = Validation runtime
Fitting model: LightGBMLarge_BAG_L3 … Training model for up to 3479.24s of the
6010.17s of remaining time.
        Fitting 8 child models (S14F1 - S14F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -157.9302        = Validation score   (-mean_absolute_error)
        79.05s   = Training   runtime
        2.53s    = Validation runtime
Repeating k-fold bagging: 15/20
Fitting model: LightGBMXT_BAG_L3 … Training model for up to 3472.02s of the
6002.95s of remaining time.
        Fitting 8 child models (S15F1 - S15F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -160.737         = Validation score   (-mean_absolute_error)
        27.52s   = Training   runtime
        1.48s    = Validation runtime
Fitting model: LightGBM_BAG_L3 … Training model for up to 3468.94s of the
5999.88s of remaining time.
        Fitting 8 child models (S15F1 - S15F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -158.0051        = Validation score   (-mean_absolute_error)
        28.69s   = Training   runtime
        1.23s    = Validation runtime
Fitting model: CatBoost_BAG_L3 … Training model for up to 3465.62s of the
5996.55s of remaining time.
        Fitting 8 child models (S15F1 - S15F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -158.6227        = Validation score   (-mean_absolute_error)
        62.88s   = Training   runtime
        0.57s    = Validation runtime
Fitting model: NeuralNetFastAI_BAG_L3 … Training model for up to 3459.55s of
the 5990.48s of remaining time.
        Fitting 8 child models (S15F1 - S15F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -155.1717        = Validation score   (-mean_absolute_error)
        625.48s  = Training   runtime
        8.01s    = Validation runtime
Fitting model: XGBoost_BAG_L3 … Training model for up to 3416.08s of the
5947.02s of remaining time.
        Fitting 8 child models (S15F1 - S15F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -157.0225        = Validation score   (-mean_absolute_error)
        41.28s   = Training   runtime
        1.74s    = Validation runtime
Fitting model: NeuralNetTorch_BAG_L3 … Training model for up to 3411.91s of
the 5942.85s of remaining time.
        Fitting 8 child models (S15F1 - S15F8) | Fitting with
ParallelLocalFoldFittingStrategy
```

```
        -156.5631       = Validation score   (-mean_absolute_error)
        655.29s  = Training   runtime
        8.21s    = Validation runtime
Fitting model: LightGBMLarge_BAG_L3 … Training model for up to 3375.49s of the
5906.42s of remaining time.
        Fitting 8 child models (S15F1 - S15F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -157.962        = Validation score   (-mean_absolute_error)
        84.97s   = Training   runtime
        2.71s    = Validation runtime
Repeating k-fold bagging: 16/20
Fitting model: LightGBMXT_BAG_L3 … Training model for up to 3368.15s of the
5899.08s of remaining time.
        Fitting 8 child models (S16F1 - S16F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -160.7374       = Validation score   (-mean_absolute_error)
        29.33s   = Training   runtime
        1.57s    = Validation runtime
Fitting model: LightGBM_BAG_L3 … Training model for up to 3365.09s of the
5896.03s of remaining time.
        Fitting 8 child models (S16F1 - S16F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -158.0032       = Validation score   (-mean_absolute_error)
        30.76s   = Training   runtime
        1.31s    = Validation runtime
Fitting model: CatBoost_BAG_L3 … Training model for up to 3361.73s of the
5892.66s of remaining time.
        Fitting 8 child models (S16F1 - S16F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -158.6319       = Validation score   (-mean_absolute_error)
        67.27s   = Training   runtime
        0.61s    = Validation runtime
Fitting model: NeuralNetFastAI_BAG_L3 … Training model for up to 3356.01s of
the 5886.94s of remaining time.
        Fitting 8 child models (S16F1 - S16F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -155.1523       = Validation score   (-mean_absolute_error)
        667.53s  = Training   runtime
        8.51s    = Validation runtime
Fitting model: XGBoost_BAG_L3 … Training model for up to 3312.47s of the
5843.41s of remaining time.
        Fitting 8 child models (S16F1 - S16F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -157.031        = Validation score   (-mean_absolute_error)
        43.89s   = Training   runtime
        1.85s    = Validation runtime
Fitting model: NeuralNetTorch_BAG_L3 … Training model for up to 3308.46s of
the 5839.4s of remaining time.
```

```
        Fitting 8 child models (S16F1 - S16F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -156.5485       = Validation score   (-mean_absolute_error)
        706.55s  = Training   runtime
        8.83s    = Validation runtime
Fitting model: LightGBMLarge_BAG_L3 … Training model for up to 3255.81s of the
5786.75s of remaining time.
        Fitting 8 child models (S16F1 - S16F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -157.9517       = Validation score   (-mean_absolute_error)
        90.18s   = Training   runtime
        2.88s    = Validation runtime
Repeating k-fold bagging: 17/20
Fitting model: LightGBMXT_BAG_L3 … Training model for up to 3249.3s of the
5780.24s of remaining time.
        Fitting 8 child models (S17F1 - S17F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -160.7285       = Validation score   (-mean_absolute_error)
        31.06s   = Training   runtime
        1.67s    = Validation runtime
Fitting model: LightGBM_BAG_L3 … Training model for up to 3246.17s of the
5777.11s of remaining time.
        Fitting 8 child models (S17F1 - S17F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -158.0105       = Validation score   (-mean_absolute_error)
        32.83s   = Training   runtime
        1.39s    = Validation runtime
Fitting model: CatBoost_BAG_L3 … Training model for up to 3242.81s of the
5773.75s of remaining time.
        Fitting 8 child models (S17F1 - S17F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -158.6227       = Validation score   (-mean_absolute_error)
        72.27s   = Training   runtime
        0.64s    = Validation runtime
Fitting model: NeuralNetFastAI_BAG_L3 … Training model for up to 3236.37s of
the 5767.3s of remaining time.
        Fitting 8 child models (S17F1 - S17F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -155.1345       = Validation score   (-mean_absolute_error)
        709.04s  = Training   runtime
        9.05s    = Validation runtime
Fitting model: XGBoost_BAG_L3 … Training model for up to 3193.53s of the
5724.47s of remaining time.
        Fitting 8 child models (S17F1 - S17F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -157.0304       = Validation score   (-mean_absolute_error)
        46.68s   = Training   runtime
        1.97s    = Validation runtime
```

```
Fitting model: NeuralNetTorch_BAG_L3 … Training model for up to 3189.43s of
the 5720.36s of remaining time.
        Fitting 8 child models (S17F1 - S17F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -156.54  = Validation score   (-mean_absolute_error)
        750.47s  = Training   runtime
        9.37s    = Validation runtime
Fitting model: LightGBMLarge_BAG_L3 … Training model for up to 3144.1s of the
5675.04s of remaining time.
        Fitting 8 child models (S17F1 - S17F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -157.9355        = Validation score   (-mean_absolute_error)
        96.94s   = Training   runtime
        3.08s    = Validation runtime
Repeating k-fold bagging: 18/20
Fitting model: LightGBMXT_BAG_L3 … Training model for up to 3135.89s of the
5666.83s of remaining time.
        Fitting 8 child models (S18F1 - S18F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -160.7083        = Validation score   (-mean_absolute_error)
        32.97s   = Training   runtime
        1.77s    = Validation runtime
Fitting model: LightGBM_BAG_L3 … Training model for up to 3132.74s of the
5663.67s of remaining time.
        Fitting 8 child models (S18F1 - S18F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -158.0048        = Validation score   (-mean_absolute_error)
        34.66s   = Training   runtime
        1.47s    = Validation runtime
Fitting model: CatBoost_BAG_L3 … Training model for up to 3129.44s of the
5660.37s of remaining time.
        Fitting 8 child models (S18F1 - S18F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -158.6169        = Validation score   (-mean_absolute_error)
        76.8s    = Training   runtime
        0.68s    = Validation runtime
Fitting model: NeuralNetFastAI_BAG_L3 … Training model for up to 3123.56s of
the 5654.49s of remaining time.
        Fitting 8 child models (S18F1 - S18F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -155.1026        = Validation score   (-mean_absolute_error)
        750.81s  = Training   runtime
        9.56s    = Validation runtime
Fitting model: XGBoost_BAG_L3 … Training model for up to 3080.4s of the
5611.33s of remaining time.
        Fitting 8 child models (S18F1 - S18F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -157.0549        = Validation score   (-mean_absolute_error)
```

```
        49.31s   = Training   runtime
        2.08s    = Validation runtime
Fitting model: NeuralNetTorch_BAG_L3 … Training model for up to 3076.41s of
the 5607.34s of remaining time.
        Fitting 8 child models (S18F1 - S18F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -156.5374        = Validation score   (-mean_absolute_error)
        792.37s  = Training   runtime
        9.91s    = Validation runtime
Fitting model: LightGBMLarge_BAG_L3 … Training model for up to 3033.15s of the
5564.09s of remaining time.
        Fitting 8 child models (S18F1 - S18F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -157.9404        = Validation score   (-mean_absolute_error)
        102.87s  = Training   runtime
        3.27s    = Validation runtime
Repeating k-fold bagging: 19/20
Fitting model: LightGBMXT_BAG_L3 … Training model for up to 3025.89s of the
5556.82s of remaining time.
        Fitting 8 child models (S19F1 - S19F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -160.6925        = Validation score   (-mean_absolute_error)
        35.06s   = Training   runtime
        1.87s    = Validation runtime
Fitting model: LightGBM_BAG_L3 … Training model for up to 3022.56s of the
5553.49s of remaining time.
        Fitting 8 child models (S19F1 - S19F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -157.9822        = Validation score   (-mean_absolute_error)
        36.67s   = Training   runtime
        1.55s    = Validation runtime
Fitting model: CatBoost_BAG_L3 … Training model for up to 3019.26s of the
5550.2s of remaining time.
        Fitting 8 child models (S19F1 - S19F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -158.6134        = Validation score   (-mean_absolute_error)
        81.0s    = Training   runtime
        0.72s    = Validation runtime
Fitting model: NeuralNetFastAI_BAG_L3 … Training model for up to 3013.68s of
the 5544.62s of remaining time.
        Fitting 8 child models (S19F1 - S19F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -155.7651        = Validation score   (-mean_absolute_error)
        91.24s   = Training   runtime
        1.12s    = Validation runtime
Fitting model: LightGBMLarge_BAG_L4 … Training model for up to 5088.53s of the
5088.52s of remaining time.
        Fitting 8 child models (S2F1 - S2F8) | Fitting with
```

```
ParallelLocalFoldFittingStrategy
        -156.8782       = Validation score   (-mean_absolute_error)
        11.78s   = Training   runtime
        0.37s    = Validation runtime
Repeating k-fold bagging: 3/20
Fitting model: LightGBMXT_BAG_L4 … Training model for up to 5081.47s of the
5081.46s of remaining time.
        Fitting 8 child models (S3F1 - S3F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -159.3438       = Validation score   (-mean_absolute_error)
        5.53s    = Training   runtime
        0.3s     = Validation runtime
Fitting model: LightGBM_BAG_L4 … Training model for up to 5078.37s of the
5078.36s of remaining time.
        Fitting 8 child models (S3F1 - S3F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -156.8442       = Validation score   (-mean_absolute_error)
        6.06s    = Training   runtime
        0.26s    = Validation runtime
Fitting model: CatBoost_BAG_L4 … Training model for up to 5074.96s of the
5074.95s of remaining time.
        Fitting 8 child models (S3F1 - S3F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -157.4561       = Validation score   (-mean_absolute_error)
        11.68s   = Training   runtime
        0.11s    = Validation runtime
Fitting model: NeuralNetFastAI_BAG_L4 … Training model for up to 5069.82s of
the 5069.81s of remaining time.
        Fitting 8 child models (S3F1 - S3F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -155.8672       = Validation score   (-mean_absolute_error)
        124.99s  = Training   runtime
        1.59s    = Validation runtime
Fitting model: XGBoost_BAG_L4 … Training model for up to 5026.88s of the
5026.87s of remaining time.
        Fitting 8 child models (S3F1 - S3F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -156.1203       = Validation score   (-mean_absolute_error)
        8.42s    = Training   runtime
        0.35s    = Validation runtime
Fitting model: NeuralNetTorch_BAG_L4 … Training model for up to 5022.78s of
the 5022.77s of remaining time.
        Fitting 8 child models (S3F1 - S3F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -155.4371       = Validation score   (-mean_absolute_error)
        137.43s  = Training   runtime
        1.65s    = Validation runtime
Fitting model: LightGBMLarge_BAG_L4 … Training model for up to 4975.17s of the
```

```
4975.15s of remaining time.
        Fitting 8 child models (S3F1 - S3F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -156.3105       = Validation score   (-mean_absolute_error)
        18.37s   = Training   runtime
        0.55s    = Validation runtime
Repeating k-fold bagging: 4/20
Fitting model: LightGBMXT_BAG_L4 … Training model for up to 4967.24s of the
4967.23s of remaining time.
        Fitting 8 child models (S4F1 - S4F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -159.2405       = Validation score   (-mean_absolute_error)
        7.54s    = Training   runtime
        0.39s    = Validation runtime
Fitting model: LightGBM_BAG_L4 … Training model for up to 4963.97s of the
4963.95s of remaining time.
        Fitting 8 child models (S4F1 - S4F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -156.7163       = Validation score   (-mean_absolute_error)
        8.14s    = Training   runtime
        0.35s    = Validation runtime
Fitting model: CatBoost_BAG_L4 … Training model for up to 4960.72s of the
4960.71s of remaining time.
        Fitting 8 child models (S4F1 - S4F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -157.4416       = Validation score   (-mean_absolute_error)
        15.44s   = Training   runtime
        0.14s    = Validation runtime
Fitting model: NeuralNetFastAI_BAG_L4 … Training model for up to 4955.66s of
the 4955.64s of remaining time.
        Fitting 8 child models (S4F1 - S4F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -155.6905       = Validation score   (-mean_absolute_error)
        166.51s  = Training   runtime
        2.1s     = Validation runtime
Fitting model: XGBoost_BAG_L4 … Training model for up to 4912.76s of the
4912.75s of remaining time.
        Fitting 8 child models (S4F1 - S4F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -156.003        = Validation score   (-mean_absolute_error)
        11.08s   = Training   runtime
        0.46s    = Validation runtime
Fitting model: NeuralNetTorch_BAG_L4 … Training model for up to 4908.66s of
the 4908.65s of remaining time.
        Fitting 8 child models (S4F1 - S4F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -155.3304       = Validation score   (-mean_absolute_error)
        199.26s  = Training   runtime
```

```
        2.2s     = Validation runtime
Fitting model: LightGBMLarge_BAG_L4 … Training model for up to 4845.4s of the
4845.38s of remaining time.
        Fitting 8 child models (S4F1 - S4F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -155.9806        = Validation score   (-mean_absolute_error)
        23.84s   = Training   runtime
        0.74s    = Validation runtime
Repeating k-fold bagging: 5/20
Fitting model: LightGBMXT_BAG_L4 … Training model for up to 4838.67s of the
4838.66s of remaining time.
        Fitting 8 child models (S5F1 - S5F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -159.2084        = Validation score   (-mean_absolute_error)
        9.62s    = Training   runtime
        0.48s    = Validation runtime
Fitting model: LightGBM_BAG_L4 … Training model for up to 4835.28s of the
4835.26s of remaining time.
        Fitting 8 child models (S5F1 - S5F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -156.6553        = Validation score   (-mean_absolute_error)
        10.15s   = Training   runtime
        0.43s    = Validation runtime
Fitting model: CatBoost_BAG_L4 … Training model for up to 4831.95s of the
4831.94s of remaining time.
        Fitting 8 child models (S5F1 - S5F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -157.3596        = Validation score   (-mean_absolute_error)
        19.51s   = Training   runtime
        0.18s    = Validation runtime
Fitting model: NeuralNetFastAI_BAG_L4 … Training model for up to 4826.52s of
the 4826.51s of remaining time.
        Fitting 8 child models (S5F1 - S5F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -155.5235        = Validation score   (-mean_absolute_error)
        208.17s  = Training   runtime
        2.62s    = Validation runtime
Fitting model: XGBoost_BAG_L4 … Training model for up to 4783.43s of the
4783.42s of remaining time.
        Fitting 8 child models (S5F1 - S5F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -155.8437        = Validation score   (-mean_absolute_error)
        13.94s   = Training   runtime
        0.58s    = Validation runtime
Fitting model: NeuralNetTorch_BAG_L4 … Training model for up to 4779.22s of
the 4779.21s of remaining time.
        Fitting 8 child models (S5F1 - S5F8) | Fitting with
ParallelLocalFoldFittingStrategy
```

```
        -155.2925       = Validation score   (-mean_absolute_error)
        243.29s  = Training   runtime
        2.78s    = Validation runtime
Fitting model: LightGBMLarge_BAG_L4 … Training model for up to 4733.88s of the
4733.87s of remaining time.
        Fitting 8 child models (S5F1 - S5F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -155.8074       = Validation score   (-mean_absolute_error)
        29.95s   = Training   runtime
        0.92s    = Validation runtime
Repeating k-fold bagging: 6/20
Fitting model: LightGBMXT_BAG_L4 … Training model for up to 4726.44s of the
4726.43s of remaining time.
        Fitting 8 child models (S6F1 - S6F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -159.2132       = Validation score   (-mean_absolute_error)
        11.5s    = Training   runtime
        0.58s    = Validation runtime
Fitting model: LightGBM_BAG_L4 … Training model for up to 4723.28s of the
4723.27s of remaining time.
        Fitting 8 child models (S6F1 - S6F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -156.6568       = Validation score   (-mean_absolute_error)
        12.08s   = Training   runtime
        0.51s    = Validation runtime
Fitting model: CatBoost_BAG_L4 … Training model for up to 4720.09s of the
4720.08s of remaining time.
        Fitting 8 child models (S6F1 - S6F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -157.3373       = Validation score   (-mean_absolute_error)
        23.66s   = Training   runtime
        0.22s    = Validation runtime
Fitting model: NeuralNetFastAI_BAG_L4 … Training model for up to 4714.68s of
the 4714.66s of remaining time.
        Fitting 8 child models (S6F1 - S6F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -155.3933       = Validation score   (-mean_absolute_error)
        249.52s  = Training   runtime
        3.14s    = Validation runtime
Fitting model: XGBoost_BAG_L4 … Training model for up to 4671.99s of the
4671.98s of remaining time.
        Fitting 8 child models (S6F1 - S6F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -155.8676       = Validation score   (-mean_absolute_error)
        16.49s   = Training   runtime
        0.7s     = Validation runtime
Fitting model: NeuralNetTorch_BAG_L4 … Training model for up to 4668.05s of
the 4668.04s of remaining time.
```

```
        Fitting 8 child models (S6F1 - S6F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -155.2917       = Validation score   (-mean_absolute_error)
        282.81s  = Training   runtime
        3.3s     = Validation runtime
Fitting model: LightGBMLarge_BAG_L4 … Training model for up to 4627.29s of the
4627.28s of remaining time.
        Fitting 8 child models (S6F1 - S6F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -155.7915       = Validation score   (-mean_absolute_error)
        35.79s   = Training   runtime
        1.1s     = Validation runtime
Repeating k-fold bagging: 7/20
Fitting model: LightGBMXT_BAG_L4 … Training model for up to 4620.03s of the
4620.02s of remaining time.
        Fitting 8 child models (S7F1 - S7F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -159.2556       = Validation score   (-mean_absolute_error)
        13.29s   = Training   runtime
        0.68s    = Validation runtime
Fitting model: LightGBM_BAG_L4 … Training model for up to 4616.97s of the
4616.96s of remaining time.
        Fitting 8 child models (S7F1 - S7F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -156.5589       = Validation score   (-mean_absolute_error)
        14.71s   = Training   runtime
        0.6s     = Validation runtime
Fitting model: CatBoost_BAG_L4 … Training model for up to 4613.03s of the
4613.02s of remaining time.
        Fitting 8 child models (S7F1 - S7F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -157.335        = Validation score   (-mean_absolute_error)
        27.57s   = Training   runtime
        0.26s    = Validation runtime
Fitting model: NeuralNetFastAI_BAG_L4 … Training model for up to 4607.91s of
the 4607.9s of remaining time.
        Fitting 8 child models (S7F1 - S7F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -155.3687       = Validation score   (-mean_absolute_error)
        291.09s  = Training   runtime
        3.64s    = Validation runtime
Fitting model: XGBoost_BAG_L4 … Training model for up to 4564.93s of the
4564.92s of remaining time.
        Fitting 8 child models (S7F1 - S7F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -155.8562       = Validation score   (-mean_absolute_error)
        19.11s   = Training   runtime
        0.81s    = Validation runtime
```

```
Fitting model: NeuralNetTorch_BAG_L4 … Training model for up to 4560.94s of
the 4560.92s of remaining time.
        Fitting 8 child models (S7F1 - S7F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -155.208         = Validation score   (-mean_absolute_error)
        329.94s  = Training   runtime
        3.79s    = Validation runtime
Fitting model: LightGBMLarge_BAG_L4 … Training model for up to 4512.49s of the
4512.48s of remaining time.
        Fitting 8 child models (S7F1 - S7F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -155.7566        = Validation score   (-mean_absolute_error)
        41.7s    = Training   runtime
        1.29s    = Validation runtime
Repeating k-fold bagging: 8/20
Fitting model: LightGBMXT_BAG_L4 … Training model for up to 4505.28s of the
4505.27s of remaining time.
        Fitting 8 child models (S8F1 - S8F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -159.2404        = Validation score   (-mean_absolute_error)
        15.19s   = Training   runtime
        0.77s    = Validation runtime
Fitting model: LightGBM_BAG_L4 … Training model for up to 4502.08s of the
4502.07s of remaining time.
        Fitting 8 child models (S8F1 - S8F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -156.4821        = Validation score   (-mean_absolute_error)
        16.91s   = Training   runtime
        0.69s    = Validation runtime
Fitting model: CatBoost_BAG_L4 … Training model for up to 4498.54s of the
4498.53s of remaining time.
        Fitting 8 child models (S8F1 - S8F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -157.3011        = Validation score   (-mean_absolute_error)
        31.4s    = Training   runtime
        0.3s     = Validation runtime
Fitting model: NeuralNetFastAI_BAG_L4 … Training model for up to 4493.4s of
the 4493.38s of remaining time.
        Fitting 8 child models (S8F1 - S8F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -155.3153        = Validation score   (-mean_absolute_error)
        333.07s  = Training   runtime
        4.19s    = Validation runtime
Fitting model: XGBoost_BAG_L4 … Training model for up to 4450.05s of the
4450.03s of remaining time.
        Fitting 8 child models (S8F1 - S8F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -155.8229        = Validation score   (-mean_absolute_error)
```

```
        21.89s   = Training   runtime
        0.93s    = Validation runtime
Fitting model: NeuralNetTorch_BAG_L4 … Training model for up to 4445.97s of
the 4445.96s of remaining time.
        Fitting 8 child models (S8F1 - S8F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -155.2037        = Validation score   (-mean_absolute_error)
        377.33s  = Training   runtime
        4.3s     = Validation runtime
Fitting model: LightGBMLarge_BAG_L4 … Training model for up to 4397.18s of the
4397.17s of remaining time.
        Fitting 8 child models (S8F1 - S8F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -155.6834        = Validation score   (-mean_absolute_error)
        48.11s   = Training   runtime
        1.48s    = Validation runtime
Repeating k-fold bagging: 9/20
Fitting model: LightGBMXT_BAG_L4 … Training model for up to 4389.5s of the
4389.49s of remaining time.
        Fitting 8 child models (S9F1 - S9F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -159.2408        = Validation score   (-mean_absolute_error)
        16.89s   = Training   runtime
        0.87s    = Validation runtime
Fitting model: LightGBM_BAG_L4 … Training model for up to 4386.44s of the
4386.43s of remaining time.
        Fitting 8 child models (S9F1 - S9F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -156.5112        = Validation score   (-mean_absolute_error)
        18.91s   = Training   runtime
        0.78s    = Validation runtime
Fitting model: CatBoost_BAG_L4 … Training model for up to 4383.13s of the
4383.11s of remaining time.
        Fitting 8 child models (S9F1 - S9F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -157.2889        = Validation score   (-mean_absolute_error)
        35.71s   = Training   runtime
        0.34s    = Validation runtime
Fitting model: NeuralNetFastAI_BAG_L4 … Training model for up to 4377.45s of
the 4377.44s of remaining time.
        Fitting 8 child models (S9F1 - S9F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -155.2818        = Validation score   (-mean_absolute_error)
        374.73s  = Training   runtime
        4.71s    = Validation runtime
Fitting model: XGBoost_BAG_L4 … Training model for up to 4334.33s of the
4334.31s of remaining time.
        Fitting 8 child models (S9F1 - S9F8) | Fitting with
```

```
ParallelLocalFoldFittingStrategy
        -155.8372       = Validation score   (-mean_absolute_error)
        24.49s   = Training   runtime
        1.05s    = Validation runtime
Fitting model: NeuralNetTorch_BAG_L4 … Training model for up to 4330.25s of
the 4330.24s of remaining time.
        Fitting 8 child models (S9F1 - S9F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -155.2163       = Validation score   (-mean_absolute_error)
        420.15s  = Training   runtime
        4.85s    = Validation runtime
Fitting model: LightGBMLarge_BAG_L4 … Training model for up to 4286.13s of the
4286.12s of remaining time.
        Fitting 8 child models (S9F1 - S9F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -155.692        = Validation score   (-mean_absolute_error)
        55.85s   = Training   runtime
        1.68s    = Validation runtime
Repeating k-fold bagging: 10/20
Fitting model: LightGBMXT_BAG_L4 … Training model for up to 4277.1s of the
4277.09s of remaining time.
        Fitting 8 child models (S10F1 - S10F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -159.2384       = Validation score   (-mean_absolute_error)
        18.67s   = Training   runtime
        0.97s    = Validation runtime
Fitting model: LightGBM_BAG_L4 … Training model for up to 4274.04s of the
4274.03s of remaining time.
        Fitting 8 child models (S10F1 - S10F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -156.5153       = Validation score   (-mean_absolute_error)
        21.04s   = Training   runtime
        0.87s    = Validation runtime
Fitting model: CatBoost_BAG_L4 … Training model for up to 4270.58s of the
4270.57s of remaining time.
        Fitting 8 child models (S10F1 - S10F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -157.2724       = Validation score   (-mean_absolute_error)
        39.4s    = Training   runtime
        0.38s    = Validation runtime
Fitting model: NeuralNetFastAI_BAG_L4 … Training model for up to 4265.51s of
the 4265.5s of remaining time.
        Fitting 8 child models (S10F1 - S10F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -155.2651       = Validation score   (-mean_absolute_error)
        416.07s  = Training   runtime
        5.25s    = Validation runtime
Fitting model: XGBoost_BAG_L4 … Training model for up to 4222.83s of the
```

```
4222.82s of remaining time.
        Fitting 8 child models (S10F1 - S10F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -155.8519       = Validation score   (-mean_absolute_error)
        27.23s   = Training   runtime
        1.16s    = Validation runtime
Fitting model: NeuralNetTorch_BAG_L4 … Training model for up to 4218.48s of
the 4218.47s of remaining time.
        Fitting 8 child models (S10F1 - S10F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -155.2282       = Validation score   (-mean_absolute_error)
        462.17s  = Training   runtime
        5.4s     = Validation runtime
Fitting model: LightGBMLarge_BAG_L4 … Training model for up to 4175.07s of the
4175.06s of remaining time.
        Fitting 8 child models (S10F1 - S10F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -155.6942       = Validation score   (-mean_absolute_error)
        62.36s   = Training   runtime
        1.88s    = Validation runtime
Repeating k-fold bagging: 11/20
Fitting model: LightGBMXT_BAG_L4 … Training model for up to 4167.1s of the
4167.09s of remaining time.
        Fitting 8 child models (S11F1 - S11F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -159.2111       = Validation score   (-mean_absolute_error)
        20.44s   = Training   runtime
        1.07s    = Validation runtime
Fitting model: LightGBM_BAG_L4 … Training model for up to 4164.06s of the
4164.04s of remaining time.
        Fitting 8 child models (S11F1 - S11F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -156.506        = Validation score   (-mean_absolute_error)
        22.9s    = Training   runtime
        0.95s    = Validation runtime
Fitting model: CatBoost_BAG_L4 … Training model for up to 4160.8s of the
4160.79s of remaining time.
        Fitting 8 child models (S11F1 - S11F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -157.249        = Validation score   (-mean_absolute_error)
        45.77s   = Training   runtime
        0.42s    = Validation runtime
Fitting model: NeuralNetFastAI_BAG_L4 … Training model for up to 4153.08s of
the 4153.07s of remaining time.
        Fitting 8 child models (S11F1 - S11F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -155.2657       = Validation score   (-mean_absolute_error)
        457.87s  = Training   runtime
```

```
        5.83s    = Validation runtime
Fitting model: XGBoost_BAG_L4 … Training model for up to 4109.9s of the
4109.89s of remaining time.
        Fitting 8 child models (S11F1 - S11F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -155.8407        = Validation score   (-mean_absolute_error)
        29.89s   = Training   runtime
        1.28s    = Validation runtime
Fitting model: NeuralNetTorch_BAG_L4 … Training model for up to 4105.92s of
the 4105.91s of remaining time.
        Fitting 8 child models (S11F1 - S11F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -155.2034        = Validation score   (-mean_absolute_error)
        502.77s  = Training   runtime
        5.92s    = Validation runtime
Fitting model: LightGBMLarge_BAG_L4 … Training model for up to 4063.97s of the
4063.95s of remaining time.
        Fitting 8 child models (S11F1 - S11F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -155.7161        = Validation score   (-mean_absolute_error)
        68.34s   = Training   runtime
        2.11s    = Validation runtime
Repeating k-fold bagging: 12/20
Fitting model: LightGBMXT_BAG_L4 … Training model for up to 4056.55s of the
4056.53s of remaining time.
        Fitting 8 child models (S12F1 - S12F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -159.1918        = Validation score   (-mean_absolute_error)
        22.27s   = Training   runtime
        1.17s    = Validation runtime
Fitting model: LightGBM_BAG_L4 … Training model for up to 4053.38s of the
4053.36s of remaining time.
        Fitting 8 child models (S12F1 - S12F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -156.4777        = Validation score   (-mean_absolute_error)
        25.17s   = Training   runtime
        1.04s    = Validation runtime
Fitting model: CatBoost_BAG_L4 … Training model for up to 4049.84s of the
4049.83s of remaining time.
        Fitting 8 child models (S12F1 - S12F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -157.2357        = Validation score   (-mean_absolute_error)
        49.46s   = Training   runtime
        0.46s    = Validation runtime
Fitting model: NeuralNetFastAI_BAG_L4 … Training model for up to 4044.8s of
the 4044.79s of remaining time.
        Fitting 8 child models (S12F1 - S12F8) | Fitting with
ParallelLocalFoldFittingStrategy
```

```
        -155.1945       = Validation score   (-mean_absolute_error)
        499.99s  = Training   runtime
        6.38s    = Validation runtime
Fitting model: XGBoost_BAG_L4 … Training model for up to 4001.23s of the
4001.21s of remaining time.
        Fitting 8 child models (S12F1 - S12F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -155.8159       = Validation score   (-mean_absolute_error)
        32.7s    = Training   runtime
        1.4s     = Validation runtime
Fitting model: NeuralNetTorch_BAG_L4 … Training model for up to 3997.04s of
the 3997.03s of remaining time.
        Fitting 8 child models (S12F1 - S12F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -155.1854       = Validation score   (-mean_absolute_error)
        545.13s  = Training   runtime
        6.49s    = Validation runtime
Fitting model: LightGBMLarge_BAG_L4 … Training model for up to 3953.37s of the
3953.36s of remaining time.
        Fitting 8 child models (S12F1 - S12F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -155.6723       = Validation score   (-mean_absolute_error)
        73.94s   = Training   runtime
        2.28s    = Validation runtime
Repeating k-fold bagging: 13/20
Fitting model: LightGBMXT_BAG_L4 … Training model for up to 3946.47s of the
3946.46s of remaining time.
        Fitting 8 child models (S13F1 - S13F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -159.1962       = Validation score   (-mean_absolute_error)
        24.15s   = Training   runtime
        1.27s    = Validation runtime
Fitting model: LightGBM_BAG_L4 … Training model for up to 3943.21s of the
3943.2s of remaining time.
        Fitting 8 child models (S13F1 - S13F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -156.4899       = Validation score   (-mean_absolute_error)
        27.16s   = Training   runtime
        1.13s    = Validation runtime
Fitting model: CatBoost_BAG_L4 … Training model for up to 3939.87s of the
3939.86s of remaining time.
        Fitting 8 child models (S13F1 - S13F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -157.23  = Validation score   (-mean_absolute_error)
        53.55s   = Training   runtime
        0.51s    = Validation runtime
Fitting model: NeuralNetFastAI_BAG_L4 … Training model for up to 3934.41s of
the 3934.4s of remaining time.
```

```
        Fitting 8 child models (S13F1 - S13F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -155.1606       = Validation score   (-mean_absolute_error)
        540.96s  = Training   runtime
        6.92s    = Validation runtime
Fitting model: XGBoost_BAG_L4 … Training model for up to 3892.08s of the
3892.07s of remaining time.
        Fitting 8 child models (S13F1 - S13F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -155.8298       = Validation score   (-mean_absolute_error)
        35.52s   = Training   runtime
        1.51s    = Validation runtime
Fitting model: NeuralNetTorch_BAG_L4 … Training model for up to 3887.92s of
the 3887.91s of remaining time.
        Fitting 8 child models (S13F1 - S13F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -155.198        = Validation score   (-mean_absolute_error)
        593.62s  = Training   runtime
        7.0s     = Validation runtime
Fitting model: LightGBMLarge_BAG_L4 … Training model for up to 3838.03s of the
3838.02s of remaining time.
        Fitting 8 child models (S13F1 - S13F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -155.6834       = Validation score   (-mean_absolute_error)
        79.88s   = Training   runtime
        2.46s    = Validation runtime
Repeating k-fold bagging: 14/20
Fitting model: LightGBMXT_BAG_L4 … Training model for up to 3830.7s of the
3830.69s of remaining time.
        Fitting 8 child models (S14F1 - S14F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -159.1955       = Validation score   (-mean_absolute_error)
        26.07s   = Training   runtime
        1.38s    = Validation runtime
Fitting model: LightGBM_BAG_L4 … Training model for up to 3827.48s of the
3827.46s of remaining time.
        Fitting 8 child models (S14F1 - S14F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -156.4915       = Validation score   (-mean_absolute_error)
        29.3s    = Training   runtime
        1.21s    = Validation runtime
Fitting model: CatBoost_BAG_L4 … Training model for up to 3824.11s of the
3824.09s of remaining time.
        Fitting 8 child models (S14F1 - S14F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -157.2205       = Validation score   (-mean_absolute_error)
        57.22s   = Training   runtime
        0.55s    = Validation runtime
```

```
Fitting model: NeuralNetFastAI_BAG_L4 … Training model for up to 3819.13s of
the 3819.12s of remaining time.
        Fitting 8 child models (S14F1 - S14F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -155.1594       = Validation score   (-mean_absolute_error)
        582.37s  = Training   runtime
        7.47s    = Validation runtime
Fitting model: XGBoost_BAG_L4 … Training model for up to 3776.24s of the
3776.23s of remaining time.
        Fitting 8 child models (S14F1 - S14F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -155.7952       = Validation score   (-mean_absolute_error)
        38.42s   = Training   runtime
        1.63s    = Validation runtime
Fitting model: NeuralNetTorch_BAG_L4 … Training model for up to 3772.06s of
the 3772.05s of remaining time.
        Fitting 8 child models (S14F1 - S14F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -155.2234       = Validation score   (-mean_absolute_error)
        631.04s  = Training   runtime
        7.53s    = Validation runtime
Fitting model: LightGBMLarge_BAG_L4 … Training model for up to 3733.29s of the
3733.28s of remaining time.
        Fitting 8 child models (S14F1 - S14F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -155.6626       = Validation score   (-mean_absolute_error)
        85.67s   = Training   runtime
        2.62s    = Validation runtime
Repeating k-fold bagging: 15/20
Fitting model: LightGBMXT_BAG_L4 … Training model for up to 3726.13s of the
3726.12s of remaining time.
        Fitting 8 child models (S15F1 - S15F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -159.1887       = Validation score   (-mean_absolute_error)
        28.02s   = Training   runtime
        1.48s    = Validation runtime
Fitting model: LightGBM_BAG_L4 … Training model for up to 3722.88s of the
3722.86s of remaining time.
        Fitting 8 child models (S15F1 - S15F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -156.487        = Validation score   (-mean_absolute_error)
        31.19s   = Training   runtime
        1.3s     = Validation runtime
Fitting model: CatBoost_BAG_L4 … Training model for up to 3719.61s of the
3719.6s of remaining time.
        Fitting 8 child models (S15F1 - S15F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -157.2167       = Validation score   (-mean_absolute_error)
```

```
        60.89s   = Training   runtime
        0.59s    = Validation runtime
Fitting model: NeuralNetFastAI_BAG_L4 … Training model for up to 3714.6s of
the 3714.59s of remaining time.
        Fitting 8 child models (S15F1 - S15F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -155.1203        = Validation score   (-mean_absolute_error)
        624.33s  = Training   runtime
        8.0s     = Validation runtime
Fitting model: XGBoost_BAG_L4 … Training model for up to 3671.07s of the
3671.05s of remaining time.
        Fitting 8 child models (S15F1 - S15F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -155.8232        = Validation score   (-mean_absolute_error)
        41.15s   = Training   runtime
        1.75s    = Validation runtime
Fitting model: NeuralNetTorch_BAG_L4 … Training model for up to 3666.96s of
the 3666.95s of remaining time.
        Fitting 8 child models (S15F1 - S15F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -155.2062        = Validation score   (-mean_absolute_error)
        674.21s  = Training   runtime
        8.07s    = Validation runtime
Fitting model: LightGBMLarge_BAG_L4 … Training model for up to 3622.41s of the
3622.4s of remaining time.
        Fitting 8 child models (S15F1 - S15F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -155.6779        = Validation score   (-mean_absolute_error)
        92.6s    = Training   runtime
        2.81s    = Validation runtime
Repeating k-fold bagging: 16/20
Fitting model: LightGBMXT_BAG_L4 … Training model for up to 3614.08s of the
3614.06s of remaining time.
        Fitting 8 child models (S16F1 - S16F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -159.1787        = Validation score   (-mean_absolute_error)
        29.94s   = Training   runtime
        1.57s    = Validation runtime
Fitting model: LightGBM_BAG_L4 … Training model for up to 3610.9s of the
3610.89s of remaining time.
        Fitting 8 child models (S16F1 - S16F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -156.4629        = Validation score   (-mean_absolute_error)
        33.2s    = Training   runtime
        1.39s    = Validation runtime
Fitting model: CatBoost_BAG_L4 … Training model for up to 3607.64s of the
3607.63s of remaining time.
        Fitting 8 child models (S16F1 - S16F8) | Fitting with
```

```
ParallelLocalFoldFittingStrategy
        -157.2168       = Validation score   (-mean_absolute_error)
        65.55s   = Training   runtime
        0.62s    = Validation runtime
Fitting model: NeuralNetFastAI_BAG_L4 … Training model for up to 3601.61s of
the 3601.6s of remaining time.
        Fitting 8 child models (S16F1 - S16F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -155.0627       = Validation score   (-mean_absolute_error)
        666.23s  = Training   runtime
        8.52s    = Validation runtime
Fitting model: XGBoost_BAG_L4 … Training model for up to 3558.34s of the
3558.32s of remaining time.
        Fitting 8 child models (S16F1 - S16F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -155.8107       = Validation score   (-mean_absolute_error)
        43.91s   = Training   runtime
        1.88s    = Validation runtime
Fitting model: NeuralNetTorch_BAG_L4 … Training model for up to 3554.1s of the
3554.09s of remaining time.
        Fitting 8 child models (S16F1 - S16F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -155.1858       = Validation score   (-mean_absolute_error)
        720.08s  = Training   runtime
        8.67s    = Validation runtime
Fitting model: LightGBMLarge_BAG_L4 … Training model for up to 3506.79s of the
3506.78s of remaining time.
        Fitting 8 child models (S16F1 - S16F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -155.6624       = Validation score   (-mean_absolute_error)
        98.59s   = Training   runtime
        3.01s    = Validation runtime
Repeating k-fold bagging: 17/20
Fitting model: LightGBMXT_BAG_L4 … Training model for up to 3499.43s of the
3499.42s of remaining time.
        Fitting 8 child models (S17F1 - S17F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -159.1656       = Validation score   (-mean_absolute_error)
        31.81s   = Training   runtime
        1.67s    = Validation runtime
Fitting model: LightGBM_BAG_L4 … Training model for up to 3496.26s of the
3496.25s of remaining time.
        Fitting 8 child models (S17F1 - S17F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -156.4445       = Validation score   (-mean_absolute_error)
        35.28s   = Training   runtime
        1.48s    = Validation runtime
Fitting model: CatBoost_BAG_L4 … Training model for up to 3492.81s of the
```

```
3492.8s of remaining time.
        Fitting 8 child models (S17F1 - S17F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -157.23  = Validation score   (-mean_absolute_error)
        69.19s   = Training   runtime
        0.67s    = Validation runtime
Fitting model: NeuralNetFastAI_BAG_L4 … Training model for up to 3487.81s of
the 3487.79s of remaining time.
        Fitting 8 child models (S17F1 - S17F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -155.043         = Validation score   (-mean_absolute_error)
        708.32s  = Training   runtime
        9.09s    = Validation runtime
Fitting model: XGBoost_BAG_L4 … Training model for up to 3444.24s of the
3444.23s of remaining time.
        Fitting 8 child models (S17F1 - S17F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -155.7895        = Validation score   (-mean_absolute_error)
        46.97s   = Training   runtime
        1.99s    = Validation runtime
Fitting model: NeuralNetTorch_BAG_L4 … Training model for up to 3439.76s of
the 3439.75s of remaining time.
        Fitting 8 child models (S17F1 - S17F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -155.1924        = Validation score   (-mean_absolute_error)
        763.1s   = Training   runtime
        9.21s    = Validation runtime
Fitting model: LightGBMLarge_BAG_L4 … Training model for up to 3395.42s of the
3395.41s of remaining time.
        Fitting 8 child models (S17F1 - S17F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -155.6801        = Validation score   (-mean_absolute_error)
        104.08s  = Training   runtime
        3.17s    = Validation runtime
Repeating k-fold bagging: 18/20
Fitting model: LightGBMXT_BAG_L4 … Training model for up to 3388.63s of the
3388.62s of remaining time.
        Fitting 8 child models (S18F1 - S18F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -159.1652        = Validation score   (-mean_absolute_error)
        33.59s   = Training   runtime
        1.77s    = Validation runtime
Fitting model: LightGBM_BAG_L4 … Training model for up to 3385.39s of the
3385.38s of remaining time.
        Fitting 8 child models (S18F1 - S18F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -156.4294        = Validation score   (-mean_absolute_error)
        37.32s   = Training   runtime
```

```
        1.57s    = Validation runtime
Fitting model: CatBoost_BAG_L4 … Training model for up to 3381.94s of the
3381.92s of remaining time.
        Fitting 8 child models (S18F1 - S18F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -157.2185        = Validation score   (-mean_absolute_error)
        72.88s   = Training   runtime
        0.7s     = Validation runtime
Fitting model: NeuralNetFastAI_BAG_L4 … Training model for up to 3376.93s of
the 3376.92s of remaining time.
        Fitting 8 child models (S18F1 - S18F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -155.0174        = Validation score   (-mean_absolute_error)
        750.65s  = Training   runtime
        9.69s    = Validation runtime
Fitting model: XGBoost_BAG_L4 … Training model for up to 3333.14s of the
3333.13s of remaining time.
        Fitting 8 child models (S18F1 - S18F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -155.7924        = Validation score   (-mean_absolute_error)
        49.8s    = Training   runtime
        2.1s     = Validation runtime
Fitting model: NeuralNetTorch_BAG_L4 … Training model for up to 3328.92s of
the 3328.9s of remaining time.
        Fitting 8 child models (S18F1 - S18F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -155.1831        = Validation score   (-mean_absolute_error)
        810.37s  = Training   runtime
        9.76s    = Validation runtime
Fitting model: LightGBMLarge_BAG_L4 … Training model for up to 3280.25s of the
3280.24s of remaining time.
        Fitting 8 child models (S18F1 - S18F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -155.6715        = Validation score   (-mean_absolute_error)
        110.07s  = Training   runtime
        3.37s    = Validation runtime
Repeating k-fold bagging: 19/20
Fitting model: LightGBMXT_BAG_L4 … Training model for up to 3272.75s of the
3272.74s of remaining time.
        Fitting 8 child models (S19F1 - S19F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -159.19  = Validation score   (-mean_absolute_error)
        35.28s   = Training   runtime
        1.87s    = Validation runtime
Fitting model: LightGBM_BAG_L4 … Training model for up to 3269.65s of the
3269.64s of remaining time.
        Fitting 8 child models (S19F1 - S19F8) | Fitting with
ParallelLocalFoldFittingStrategy
```

```
        -156.4282       = Validation score   (-mean_absolute_error)
        39.55s   = Training   runtime
        1.66s    = Validation runtime
Fitting model: CatBoost_BAG_L4 … Training model for up to 3266.03s of the
3266.01s of remaining time.
        Fitting 8 child models (S19F1 - S19F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -157.2194       = Validation score   (-mean_absolute_error)
        77.51s   = Training   runtime
        0.75s    = Validation runtime
Fitting model: NeuralNetFastAI_BAG_L4 … Training model for up to 3260.05s of
the 3260.04s of remaining time.
        Fitting 8 child models (S19F1 - S19F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -154.9877       = Validation score   (-mean_absolute_error)
        791.94s  = Training   runtime
        10.4s    = Validation runtime
Fitting model: XGBoost_BAG_L4 … Training model for up to 3217.34s of the
3217.32s of remaining time.
        Fitting 8 child models (S19F1 - S19F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -155.8098       = Validation score   (-mean_absolute_error)
        52.37s   = Training   runtime
        2.21s    = Validation runtime
Fitting model: NeuralNetTorch_BAG_L4 … Training model for up to 3213.18s of
the 3213.17s of remaining time.
        Fitting 8 child models (S19F1 - S19F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -155.1954       = Validation score   (-mean_absolute_error)
        850.99s  = Training   runtime
        10.28s   = Validation runtime
Fitting model: LightGBMLarge_BAG_L4 … Training model for up to 3171.2s of the
3171.19s of remaining time.
        Fitting 8 child models (S19F1 - S19F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -155.6921       = Validation score   (-mean_absolute_error)
        116.58s  = Training   runtime
        3.56s    = Validation runtime
Repeating k-fold bagging: 20/20
Fitting model: LightGBMXT_BAG_L4 … Training model for up to 3163.32s of the
3163.31s of remaining time.
        Fitting 8 child models (S20F1 - S20F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -159.1965       = Validation score   (-mean_absolute_error)
        37.16s   = Training   runtime
        1.97s    = Validation runtime
Fitting model: LightGBM_BAG_L4 … Training model for up to 3160.16s of the
3160.14s of remaining time.
```

```
        Fitting 8 child models (S20F1 - S20F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -156.4496       = Validation score   (-mean_absolute_error)
        41.7s    = Training   runtime
        1.76s    = Validation runtime
Fitting model: CatBoost_BAG_L4 … Training model for up to 3156.5s of the
3156.49s of remaining time.
        Fitting 8 child models (S20F1 - S20F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -157.2248       = Validation score   (-mean_absolute_error)
        81.15s   = Training   runtime
        0.78s    = Validation runtime
Fitting model: NeuralNetFastAI_BAG_L4 … Training model for up to 3151.47s of
the 3151.46s of remaining time.
        Fitting 8 child models (S20F1 - S20F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -154.9889       = Validation score   (-mean_absolute_error)
        833.42s  = Training   runtime
        10.91s   = Validation runtime
Fitting model: XGBoost_BAG_L4 … Training model for up to 3108.63s of the
3108.62s of remaining time.
        Fitting 8 child models (S20F1 - S20F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -155.8165       = Validation score   (-mean_absolute_error)
        55.26s   = Training   runtime
        2.32s    = Validation runtime
Fitting model: NeuralNetTorch_BAG_L4 … Training model for up to 3104.19s of
the 3104.18s of remaining time.
        Fitting 8 child models (S20F1 - S20F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -155.1922       = Validation score   (-mean_absolute_error)
        893.71s  = Training   runtime
        10.83s   = Validation runtime
Fitting model: LightGBMLarge_BAG_L4 … Training model for up to 3059.98s of the
3059.96s of remaining time.
        Fitting 8 child models (S20F1 - S20F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -155.7065       = Validation score   (-mean_absolute_error)
        122.53s  = Training   runtime
        3.75s    = Validation runtime
Completed 20/20 k-fold bagging repeats …
Fitting model: WeightedEnsemble_L5 … Training model for up to 532.99s of the
3052.73s of remaining time.
        -153.2335       = Validation score   (-mean_absolute_error)
        0.63s    = Training   runtime
        0.0s     = Validation runtime
AutoGluon training complete, total runtime = 11347.93s … Best model:
"WeightedEnsemble_L5"
```

```
TabularPredictor saved. To load, use: predictor =
TabularPredictor.load("AutogluonModels/submission_88_A/")
```

[ ]:
```
loc = "B"
predictors[1] = fit_predictor_for_location(loc)
```

```
Beginning AutoGluon training … Time limit = 14400s
AutoGluon will save models to "AutogluonModels/submission_88_B/"
AutoGluon Version:  0.8.2
Python Version:     3.10.12
Operating System:   Linux
Platform Machine:   x86_64
Platform Version:   #1 SMP Debian 5.10.197-1 (2023-09-29)
Disk Space Avail:   294.36 GB / 315.93 GB (93.2%)
Train Data Rows:    32819
Train Data Columns: 46
Label Column: y
Preprocessing data …
AutoGluon infers your prediction problem is: 'regression' (because dtype of
label-column == float and many unique label-values observed).
        Label info (max, min, mean, stddev): (1152.3, -0.0, 96.89334, 194.00409)
        If 'regression' is not the correct problem_type, please manually specify
the problem_type parameter during predictor init (You may specify problem_type
as one of: ['binary', 'multiclass', 'regression'])
Using Feature Generators to preprocess the data …
Fitting AutoMLPipelineFeatureGenerator…
        Available Memory:                    129078.6 MB
        Train Data (Original)  Memory Usage: 13.72 MB (0.0% of available memory)
        Inferring data type of each feature based on column values. Set
feature_metadata_in to manually specify special dtypes of the features.
        Stage 1 Generators:
                Fitting AsTypeFeatureGenerator…
                        Note: Converting 4 features to boolean dtype as they
only contain 2 unique values.
        Stage 2 Generators:
                Fitting FillNaFeatureGenerator…
        Stage 3 Generators:
                Fitting IdentityFeatureGenerator…
        Stage 4 Generators:
                Fitting DropUniqueFeatureGenerator…

Training model for location B…
Train data sample weight sum: 32819
Train data number of rows: 32819

        Stage 5 Generators:
                Fitting DropDuplicatesFeatureGenerator…
        Useless Original Features (Count: 3): ['elevation:m', 'sample_weight',
'location']
```

```
                These features carry no predictive signal and should be manually
investigated.
                This is typically a feature which has the same value for all
rows.
                These features do not need to be present at inference time.
        Types of features in original data (raw dtype, special dtypes):
                ('float', []) : 42 | ['absolute_humidity_2m:gm3',
'air_density_2m:kgm3', 'ceiling_height_agl:m', 'clear_sky_energy_1h:J',
'clear_sky_rad:W', …]
                ('int', [])   :  1 | ['is_estimated']
        Types of features in processed data (raw dtype, special dtypes):
                ('float', [])     : 39 | ['absolute_humidity_2m:gm3',
'air_density_2m:kgm3', 'ceiling_height_agl:m', 'clear_sky_energy_1h:J',
'clear_sky_rad:W', …]
                ('int', ['bool']) :  4 | ['is_day:idx', 'is_in_shadow:idx',
'wind_speed_w_1000hPa:ms', 'is_estimated']
        0.2s = Fit runtime
        43 features in original data used to generate 43 features in processed
data.
        Train Data (Processed) Memory Usage: 10.37 MB (0.0% of available memory)
Data preprocessing and feature engineering runtime = 0.23s …
AutoGluon will gauge predictive performance using evaluation metric:
'mean_absolute_error'
        This metric's sign has been flipped to adhere to being higher_is_better.
The metric score can be multiplied by -1 to get the metric value.
        To change this, specify the eval_metric parameter of Predictor()
User-specified model hyperparameters to be fit:
{
        'NN_TORCH': {},
        'GBM': [{'extra_trees': True, 'ag_args': {'name_suffix': 'XT'}}, {},
'GBMLarge'],
        'CAT': {},
        'XGB': {},
        'FASTAI': {},
        'RF': [{'criterion': 'gini', 'ag_args': {'name_suffix': 'Gini',
'problem_types': ['binary', 'multiclass']}}, {'criterion': 'entropy', 'ag_args':
{'name_suffix': 'Entr', 'problem_types': ['binary', 'multiclass']}},
{'criterion': 'squared_error', 'ag_args': {'name_suffix': 'MSE',
'problem_types': ['regression', 'quantile']}}],
        'XT': [{'criterion': 'gini', 'ag_args': {'name_suffix': 'Gini',
'problem_types': ['binary', 'multiclass']}}, {'criterion': 'entropy', 'ag_args':
{'name_suffix': 'Entr', 'problem_types': ['binary', 'multiclass']}},
{'criterion': 'squared_error', 'ag_args': {'name_suffix': 'MSE',
'problem_types': ['regression', 'quantile']}}],
        'KNN': [{'weights': 'uniform', 'ag_args': {'name_suffix': 'Unif'}},
{'weights': 'distance', 'ag_args': {'name_suffix': 'Dist'}}],
}
AutoGluon will fit 4 stack levels (L1 to L4) …
```

```
Fitting 11 L1 models …
Fitting model: KNeighborsUnif_BAG_L1 … Training model for up to 4798.72s of
the 14399.77s of remaining time.
        -56.8634         = Validation score   (-mean_absolute_error)
        0.05s    = Training   runtime
        0.36s    = Validation runtime
Fitting model: KNeighborsDist_BAG_L1 … Training model for up to 4798.11s of
the 14399.15s of remaining time.
        -56.811  = Validation score   (-mean_absolute_error)
        0.04s    = Training   runtime
        0.37s    = Validation runtime
Fitting model: LightGBMXT_BAG_L1 … Training model for up to 4797.64s of the
14398.69s of remaining time.
        Fitting 8 child models (S1F1 - S1F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -31.1829         = Validation score   (-mean_absolute_error)
        33.76s   = Training   runtime
        15.13s   = Validation runtime
Fitting model: LightGBM_BAG_L1 … Training model for up to 4760.0s of the
14361.04s of remaining time.
        Fitting 8 child models (S1F1 - S1F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -31.7734         = Validation score   (-mean_absolute_error)
        37.51s   = Training   runtime
        17.65s   = Validation runtime
Fitting model: RandomForestMSE_BAG_L1 … Training model for up to 4719.21s of
the 14320.25s of remaining time.
        -35.687  = Validation score   (-mean_absolute_error)
        10.24s   = Training   runtime
        1.38s    = Validation runtime
Fitting model: CatBoost_BAG_L1 … Training model for up to 4707.03s of the
14308.08s of remaining time.
        Fitting 8 child models (S1F1 - S1F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -33.5917         = Validation score   (-mean_absolute_error)
        205.05s  = Training   runtime
        0.08s    = Validation runtime
Fitting model: ExtraTreesMSE_BAG_L1 … Training model for up to 4500.71s of the
14101.75s of remaining time.
        -36.2374         = Validation score   (-mean_absolute_error)
        2.08s    = Training   runtime
        1.39s    = Validation runtime
Fitting model: NeuralNetFastAI_BAG_L1 … Training model for up to 4496.64s of
the 14097.68s of remaining time.
        Fitting 8 child models (S1F1 - S1F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -38.8281         = Validation score   (-mean_absolute_error)
        40.24s   = Training   runtime
```

```
        0.55s    = Validation runtime
Fitting model: XGBoost_BAG_L1 … Training model for up to 4455.12s of the
14056.17s of remaining time.
        Fitting 8 child models (S1F1 - S1F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -34.2481         = Validation score   (-mean_absolute_error)
        102.27s  = Training   runtime
        22.28s   = Validation runtime
Fitting model: NeuralNetTorch_BAG_L1 … Training model for up to 4349.3s of the
13950.34s of remaining time.
        Fitting 8 child models (S1F1 - S1F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -32.4706         = Validation score   (-mean_absolute_error)
        151.74s  = Training   runtime
        0.42s    = Validation runtime
Fitting model: LightGBMLarge_BAG_L1 … Training model for up to 4196.18s of the
13797.22s of remaining time.
        Fitting 8 child models (S1F1 - S1F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -30.3551         = Validation score   (-mean_absolute_error)
        109.86s  = Training   runtime
        25.88s   = Validation runtime
Repeating k-fold bagging: 2/20
Fitting model: LightGBMXT_BAG_L1 … Training model for up to 4081.04s of the
13682.09s of remaining time.
        Fitting 8 child models (S2F1 - S2F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -30.4754         = Validation score   (-mean_absolute_error)
        66.82s   = Training   runtime
        31.23s   = Validation runtime
Fitting model: LightGBM_BAG_L1 … Training model for up to 4044.41s of the
13645.45s of remaining time.
        Fitting 8 child models (S2F1 - S2F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -30.9299         = Validation score   (-mean_absolute_error)
        73.5s    = Training   runtime
        34.74s   = Validation runtime
Fitting model: CatBoost_BAG_L1 … Training model for up to 4004.05s of the
13605.09s of remaining time.
        Fitting 8 child models (S2F1 - S2F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -33.0448         = Validation score   (-mean_absolute_error)
        409.79s  = Training   runtime
        0.17s    = Validation runtime
Fitting model: NeuralNetFastAI_BAG_L1 … Training model for up to 3797.92s of
the 13398.97s of remaining time.
        Fitting 8 child models (S2F1 - S2F8) | Fitting with
ParallelLocalFoldFittingStrategy
```

```
        -38.2435        = Validation score   (-mean_absolute_error)
        80.17s   = Training   runtime
        1.1s     = Validation runtime
Fitting model: XGBoost_BAG_L1 … Training model for up to 3756.53s of the
13357.57s of remaining time.
        Fitting 8 child models (S2F1 - S2F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -33.3042        = Validation score   (-mean_absolute_error)
        202.9s   = Training   runtime
        50.97s   = Validation runtime
Fitting model: NeuralNetTorch_BAG_L1 … Training model for up to 3650.59s of
the 13251.63s of remaining time.
        Fitting 8 child models (S2F1 - S2F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -31.5854        = Validation score   (-mean_absolute_error)
        316.01s  = Training   runtime
        0.8s     = Validation runtime
Fitting model: LightGBMLarge_BAG_L1 … Training model for up to 3484.95s of the
13085.99s of remaining time.
        Fitting 8 child models (S2F1 - S2F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -29.9583        = Validation score   (-mean_absolute_error)
        219.1s   = Training   runtime
        51.21s   = Validation runtime
Repeating k-fold bagging: 3/20
Fitting model: LightGBMXT_BAG_L1 … Training model for up to 3370.47s of the
12971.52s of remaining time.
        Fitting 8 child models (S3F1 - S3F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -30.2899        = Validation score   (-mean_absolute_error)
        101.84s  = Training   runtime
        50.02s   = Validation runtime
Fitting model: LightGBM_BAG_L1 … Training model for up to 3332.27s of the
12933.31s of remaining time.
        Fitting 8 child models (S3F1 - S3F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -30.7063        = Validation score   (-mean_absolute_error)
        109.62s  = Training   runtime
        51.68s   = Validation runtime
Fitting model: CatBoost_BAG_L1 … Training model for up to 3292.07s of the
12893.12s of remaining time.
        Fitting 8 child models (S3F1 - S3F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -32.8866        = Validation score   (-mean_absolute_error)
        614.29s  = Training   runtime
        0.25s    = Validation runtime
Fitting model: NeuralNetFastAI_BAG_L1 … Training model for up to 3086.3s of
the 12687.35s of remaining time.
```

```
        Fitting 8 child models (S3F1 - S3F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -37.9967        = Validation score   (-mean_absolute_error)
        120.03s  = Training   runtime
        1.64s    = Validation runtime
Fitting model: XGBoost_BAG_L1 … Training model for up to 3045.17s of the
12646.21s of remaining time.
        Fitting 8 child models (S3F1 - S3F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -33.0492        = Validation score   (-mean_absolute_error)
        306.34s  = Training   runtime
        80.7s    = Validation runtime
Fitting model: NeuralNetTorch_BAG_L1 … Training model for up to 2938.07s of
the 12539.11s of remaining time.
        Fitting 8 child models (S3F1 - S3F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -29.8572        = Validation score   (-mean_absolute_error)
        329.31s  = Training   runtime
        76.06s   = Validation runtime
Repeating k-fold bagging: 4/20
Fitting model: LightGBMXT_BAG_L1 … Training model for up to 2661.97s of the
12263.02s of remaining time.
        Fitting 8 child models (S4F1 - S4F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -30.204  = Validation score   (-mean_absolute_error)
        136.41s  = Training   runtime
        64.46s   = Validation runtime
Fitting model: LightGBM_BAG_L1 … Training model for up to 2624.34s of the
12225.38s of remaining time.
        Fitting 8 child models (S4F1 - S4F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -30.533  = Validation score   (-mean_absolute_error)
        146.18s  = Training   runtime
        66.38s   = Validation runtime
Fitting model: CatBoost_BAG_L1 … Training model for up to 2584.42s of the
12185.46s of remaining time.
        Fitting 8 child models (S4F1 - S4F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -32.7821        = Validation score   (-mean_absolute_error)
        819.62s  = Training   runtime
        0.33s    = Validation runtime
Fitting model: NeuralNetFastAI_BAG_L1 … Training model for up to 2377.82s of
the 11978.86s of remaining time.
        Fitting 8 child models (S4F1 - S4F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -37.8978        = Validation score   (-mean_absolute_error)
        159.74s  = Training   runtime
        2.15s    = Validation runtime
```

```
Fitting model: XGBoost_BAG_L1 … Training model for up to 2336.85s of the
11937.89s of remaining time.
        Fitting 8 child models (S4F1 - S4F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -32.8399         = Validation score   (-mean_absolute_error)
        408.07s  = Training   runtime
        106.03s  = Validation runtime
Fitting model: NeuralNetTorch_BAG_L1 … Training model for up to 2230.55s of
the 11831.59s of remaining time.
        Fitting 8 child models (S4F1 - S4F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -31.2209         = Validation score   (-mean_absolute_error)
        628.38s  = Training   runtime
        1.58s    = Validation runtime
Fitting model: LightGBMLarge_BAG_L1 … Training model for up to 2076.16s of the
11677.2s of remaining time.
        Fitting 8 child models (S4F1 - S4F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -25.4512         = Validation score   (-mean_absolute_error)
        438.78s  = Training   runtime
        2.7s     = Validation runtime
Fitting model: LightGBMLarge_BAG_L2 … Training model for up to 3443.0s of the
9068.12s of remaining time.
        Fitting 8 child models (S5F1 - S5F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -25.3736         = Validation score   (-mean_absolute_error)
        861.25s  = Training   runtime
        5.74s    = Validation runtime
Fitting model: LightGBMLarge_BAG_L2 … Training model for up to 2413.87s of the
8038.99s of remaining time.
        Fitting 8 child models (S10F1 - S10F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -25.7636         = Validation score   (-mean_absolute_error)
        322.26s  = Training   runtime
        0.69s    = Validation runtime
Fitting model: NeuralNetFastAI_BAG_L2 … Training model for up to 1384.25s of
the 7009.37s of remaining time.
        Fitting 8 child models (S15F1 - S15F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -24.8873         = Validation score   (-mean_absolute_error)
        605.24s  = Training   runtime
        8.34s    = Validation runtime
Fitting model: XGBoost_BAG_L2 … Training model for up to 1342.66s of the
6967.78s of remaining time.
        Fitting 8 child models (S15F1 - S15F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -25.4353         = Validation score   (-mean_absolute_error)
        49.51s   = Training   runtime
```

```
        1.91s    = Validation runtime
Fitting model: NeuralNetTorch_BAG_L2 … Training model for up to 1338.05s of
the 6963.17s of remaining time.
        Fitting 8 child models (S15F1 - S15F8) | Fitting with
ParallelLocalFoldFittingStrategy
        -25.3529         = Validation score   (-mean_absolute_error)
        1271.15s         = Training   runtime
        8.61s    = Validation runtime
Fitting model: LightGBMLarge_BAG_L2 … Training model for up to 1252.7s of the
6877.82s of remaining time.
        Fitting 8 child models (S15F1 - S15F8) | Fitting with
ParallelLocalFoldFittingStrategy
```

[ ]:
```
loc = "C"
predictors[2] = fit_predictor_for_location(loc)
```

3 Submit

[ ]:
```
import pandas as pd
import matplotlib.pyplot as plt

train_data_with_dates = TabularDataset('X_train_raw.csv')
train_data_with_dates["ds"] = pd.to_datetime(train_data_with_dates["ds"])

test_data = TabularDataset('X_test_raw.csv')
test_data["ds"] = pd.to_datetime(test_data["ds"])
#test_data
```

[ ]:
```
test_ids = TabularDataset('test.csv')
test_ids["time"] = pd.to_datetime(test_ids["time"])
# merge test_data with test_ids
test_data_merged = pd.merge(test_data, test_ids, how="inner", right_on=["time",␣
 ↪"location"], left_on=["ds", "location"])

#test_data_merged
```

[ ]:
```
# predict, grouped by location
predictions = []
location_map = {
    "A": 0,
    "B": 1,
    "C": 2
}
for loc, group in test_data.groupby('location'):
    i = location_map[loc]
    subset = test_data_merged[test_data_merged["location"] == loc].
 ↪reset_index(drop=True)
```

```
    #print(subset)
    pred = predictors[i].predict(subset)
    subset["prediction"] = pred
    predictions.append(subset)

    # get past predictions
    past_pred = predictors[i].
 ↪predict(train_data_with_dates[train_data_with_dates["location"] == loc])
    train_data_with_dates.loc[train_data_with_dates["location"] == loc,␣
 ↪"prediction"] = past_pred
```

[ ]:
```
# plot predictions for location A, in addition to train data for A
for loc, idx in location_map.items():
    fig, ax = plt.subplots(figsize=(20, 10))
    # plot train data
    train_data_with_dates[train_data_with_dates["location"]==loc].plot(x='ds',␣
 ↪y='y', ax=ax, label="train data")

    # plot predictions
    predictions[idx].plot(x='ds', y='prediction', ax=ax, label="predictions")

    # plot past predictions
    train_data_with_dates[train_data_with_dates["location"]==loc].plot(x='ds',␣
 ↪y='prediction', ax=ax, label="past predictions")

    # title
    ax.set_title(f"Predictions for location {loc}")
```

[ ]:
```
# concatenate predictions
submissions_df = pd.concat(predictions)
submissions_df = submissions_df[["id", "prediction"]]
submissions_df
```

[ ]:
```
# Save the submission DataFrame to submissions folder, create new name based on␣
 ↪last submission, format is submission_<last_submission_number + 1>.csv

# Save the submission
print(f"Saving submission to submissions/{new_filename}.csv")
submissions_df.to_csv(os.path.join('submissions', f"{new_filename}.csv"),␣
 ↪index=False)
print("jall1a")
```

[ ]:
```
# save this running notebook
from IPython.display import display, Javascript
import time
```

```
# hei123

display(Javascript("IPython.notebook.save_checkpoint();"))

time.sleep(3)
```

[ ]:
```
# save this notebook to submissions folder
import subprocess
import os
subprocess.run(["jupyter", "nbconvert", "--to", "pdf", "--output", os.path.
 ↪join('notebook_pdfs', f"{new_filename}.pdf"), "autogluon_each_location.
 ↪ipynb"])
```

[ ]:
```
# feature importance
location="A"
split_time = pd.Timestamp("2022-10-28 22:00:00")
estimated = train_data_with_dates[train_data_with_dates["ds"] >= split_time]
estimated = estimated[estimated["location"] == location]
predictors[0].feature_importance(feature_stage="original", data=estimated,␣
 ↪time_limit=60*10)
```

[ ]:
```
# feature importance
observed = train_data_with_dates[train_data_with_dates["ds"] < split_time]
observed = observed[observed["location"] == location]
predictors[0].feature_importance(feature_stage="original", data=observed,␣
 ↪time_limit=60*10)
```

[ ]:
```
display(Javascript("IPython.notebook.save_checkpoint();"))
time.sleep(3)

subprocess.run(["jupyter", "nbconvert", "--to", "pdf", "--output", os.path.
 ↪join('notebook_pdfs', f"{new_filename}_with_feature_importance.pdf"),␣
 ↪"autogluon_each_location.ipynb"])
```

[ ]:
```
# import subprocess

# def execute_git_command(directory, command):
#     """Execute a Git command in the specified directory."""
#     try:
#         result = subprocess.check_output(['git', '-C', directory] + command,␣
 ↪stderr=subprocess.STDOUT)
#         return result.decode('utf-8').strip(), True
#     except subprocess.CalledProcessError as e:
#         print(f"Git command failed with message: {e.output.decode('utf-8').
 ↪strip()}")
#         return e.output.decode('utf-8').strip(), False
```

```
# git_repo_path = "."

# execute_git_command(git_repo_path, ['config', 'user.email',␣
 ↪'henrikskog01@gmail.com'])
# execute_git_command(git_repo_path, ['config', 'user.name', hello if hello is␣
 ↪not None else 'Henrik eller Jørgen'])

# branch_name = new_filename

# # add datetime to branch name
# branch_name += f"_{pd.Timestamp.now().strftime('%Y-%m-%d_%H-%M-%S')}"

# commit_msg = "run result"

# execute_git_command(git_repo_path, ['checkout', '-b',branch_name])

# # Navigate to your repo and commit changes
# execute_git_command(git_repo_path, ['add', '.'])
# execute_git_command(git_repo_path, ['commit', '-m',commit_msg])

# # Push to remote
# output, success = execute_git_command(git_repo_path, ['push',␣
 ↪'origin',branch_name])

# # If the push fails, try setting an upstream branch and push again
# if not success and 'upstream' in output:
#     print("Attempting to set upstream and push again...")
#     execute_git_command(git_repo_path, ['push', '--set-upstream',␣
 ↪'origin',branch_name])
#     execute_git_command(git_repo_path, ['push', 'origin', 'henrik_branch'])

# execute_git_command(git_repo_path, ['checkout', 'main'])
```